

MATH 1503 – COLLEGE ALGEBRA (Fall, 2014 / Spring, 2015)
GENERAL INFORMATION

REQUIRED MATERIALS:

1. Textbook: **College Algebra** , by Stitz and Zeager, Version 3, Open Source download at: <http://www.stitz-zeager.com/szca07042013.pdf>
2. Study Guide
3. Calculator: You will need a graphing calculator; the TI-83-84 are preferred, and are the ones that will be used by the instructor. Calculators with symbolic manipulation, such as the TI-89, are not allowed. You are welcome to use a different calculator, but do not expect your instructor to be familiar with other calculators.

All decisions made in this class will adhere to this syllabus. To ensure fairness and consistency for all students in this course, all instructors will use the same syllabus, objectives, uniform examinations, grading scale, and course policies. You are responsible for reading and following all policies stated in this syllabus.

COURSE CONTENT

Mathematics 1503 is designed to prepare students for engineering calculus, not business calculus. **This course is NOT an acceptable prerequisite for MATH 1643 or MATH 1743. If you are uncertain about the suitability of this course for your major, please consult your advisor immediately.**

The focus is on functions and their properties, including polynomial, exponential, and logarithmic functions. This course may be used to satisfy the mathematics component of the University's General Education program.

PREREQUISITE

A student must either successfully complete Math 0123 or an equivalent course, or the student must make a satisfactory score on the placement examination before entering this course, or have an appropriate score on the ACT or SAT examination.

GRADING

ITEMS	SEMESTER GRADING.
100 PTS EXAM ONE	537 PTS - 600 PTS: A
100 PTS EXAM TWO	477 PTS - 536 PTS: B
100 PTS EXAM THREE	417 PTS - 478 PTS: C
40 PTS In Class Quizzes (Eight 5-point quizzes)	357 PTS - 416 PTS: D*
200 PTS FINAL EXAM	0 PTS - 356 PTS: F
60 PTS HOMEWORK	
600 PTS POINTS POSSIBLE	

*A D indicates you should consider repeating this course for a better foundation before attempting the next course.

UNIFORM FINAL EXAMINATION

The final examination for this class is comprehensive and will be worth 200 points. It will consist of 21 multiple-choice questions and 8 long answer questions. The final will be given only at the scheduled time. No make-ups will be scheduled other than those allowed by university regulations. **Do not schedule any conflicts with the final exam, including elective surgery, work, travel, or classes at other institutions.** If you miss the final exam, contact the course moderator, Laniel Gibson (gibby@ou.edu), immediately.

Final Exam Rule: If the percentage score on the final exam is greater than the lowest regular exam score, then the percentage score on the final exam will replace the lowest exam score only if that regular exam score is not a zero.

EXAMINATIONS

There will be three 100-point evening examinations during the semester. The dates of the exams are posted on D2L. Each exam will consist of 15 multiple-choice questions and 6 long answer questions. In general, individual exams will not be curved.

All students are expected to adjust their schedules to accommodate these tests. The only absolutely acceptable reason for a makeup will be a normally scheduled class or university-sanctioned activity on Thursday night. All other requests will be considered on an individual basis. All requests for makeups must be submitted in writing using the form on page 5. **All requests for makeup exams MUST be submitted by 5 p.m. on Tuesday of exam week.** Make-up exams will be offered at 7:20 a.m. on Thursday, exam day, probably in PHSC 201. Special arrangements may be made by contacting the course moderator, Mr. Laniel Gibson, (gibby@ou.edu) as soon as possible. Instructors do not make decisions about makeups; such decisions will be made solely by the course moderator.

EXAMINATION STUDY SUGGESTIONS

Complete and master all homework problems as they are assigned. Work additional problems until you feel you have mastered the material. Make sure you can successfully work the homework problems without assistance before the exam.

Get help as soon as you need it. There are several sources of assistance.

1. The mathematics department has a help lab in PHSC 209. Instructors will be available to answer questions. The lab will be open 9:30-5:30 M – Th and 9:30 to 3:30 F.
2. Action Tutoring is available. Find out more information at Wagner Hall.
3. The Mathematics Department Office has an approved tutor list available on request.

Review early. Make sure you understand the stated objectives. Anticipate questions you expect to see on the exam. Make sure you will recognize the necessary steps to solve each type of problem from homework. Get copies of old exams from the test files and practice working them. Write and work your own exam. Leave no gaps in your understanding. The exam questions are designed to reward the students who have mastered ALL of the homework concepts.

ATTENDANCE

You are expected to attend every class period. It is the student's responsibility to get missed lecture notes when absences do occur. Excessive absences will be penalized. If your class meets three times per week, you will lose 2 points for each absence in excess of six. If your class meets two times per week, you will lose 3 points for each absence in excess of four. In general, all absences will count toward the total allowed, excused or not. This policy does not mean that you may have 4 or 6 absences in addition to excused, it means you will be penalized only after the first 4 – 6 absences (for any reason).

TUTORING

The Department of Mathematics maintains a help lab in PHSC 209. It will be open M-Th 9:30-5:30 p.m and F 9:30 to 3:30. No appointments are required. University College offers Action Tutoring. Have specific questions ready for the tutors when you go. If you are unable to do two or more problems on the homework assignment, you should get help before the next class period.

ACADEMIC MISCONDUCT

Any cases of academic misconduct will be strictly dealt with according to the University of Oklahoma Student Code. All cases of academic misconduct will be reported to the Dean of the College of Arts and Sciences for adjudication. Students are encouraged to visit (and are expected to be aware of) the Provost's webpage on academic integrity, found at this website: <http://www.integrity.ou.edu/>. Please be aware of the information on calculators.

SPECIAL ACCOMMODATIONS

Any student in this course who has a disability that may prevent her/him from fully demonstrating her/his abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate her/his educational opportunity. All accommodations will be made at the suggestion of, and with the approval of the Office of Disability Services, 620 Elm, Room 166.

CLASSWORK

1. Homework will be done out of the Study Guide. Your instructor may require extra homework. The homework points cannot exceed 60, and, along with the in-class quizzes, the total cannot exceed 100 points, even if you earn extra credit.
2. There will be 8 in class quizzes, each worth 5 points. The quiz questions will be patterned after the questions in this study guide. The schedule is listed on Page 6.
3. If an instructor chooses to offer extra credit, these points will apply strictly to the homework portion of the grade, up to a total of 60 points.
4. Before you do the exercises, read each lesson in your textbook and use the referenced examples when appropriate! **For every class period, you should expect to spend at least one to two hours on homework assignments and study time.**

5. Make sure you get help BEFORE class if you have more than 2 questions on the homework assignment due that day. Start your homework in plenty of time to get help before the next class. Do not spend an excessive amount of time trying to figure out one problem. Get help BEFORE you get frustrated, but not before you studied your book, especially the examples.
6. The problems listed here are the minimum assignment. You are your best teacher. Individually, you may need to do additional problems for mastery and understanding. (Especially the odd problems where you can self-check your answers). Always show your work and check odd problems in the back of the textbook or the solutions manual, making appropriate corrections in your work.
7. If you are absent, it is your responsibility to have the next homework assignment ready for the next class. Remember that you have a schedule that informs you of what the next assignment will be.

EMAIL AND DESIRE2LEARN

You are expected to check your email account on a regular, frequent basis. Desire2Learn will be used to provide updates on the course and to post grades. Your instructor and the course moderator will use the OU's email system to send messages and to distribute grades. **You are responsible for all messages sent via email.**

All students are assigned an email address by the university. If you have another address that you prefer to use, you can forward all email to your OU address by going to <https://webapps.ou.edu/pass>. If you do not have a computer to access your account, you can go to any of the computer labs on campus for help. If you forward your OU email, please be sure your account is up-to-date, your mailbox is not full, and that it is set to receive messages from the mathematics department. If your computer goes down, please check your account from another location!

QUESTIONS

All questions, problems, complaints, and requests should be directed to the course moderator, Mr. Laniel Gibson, at 325-3062, or gibby@ou.edu. Please include your name, ID#, and course number and section in all messages.

<p>In general, students who attend class, work problems on a regular frequent basis, and get help as needed are the students who succeed in this course. Do not assume that this material is all review.</p>

REQUEST FORM FOR PERMISSION TO TAKE MAKE-UP EXAM

**DO NOT SUBMIT THIS FORM WITHOUT DOCUMENTATION.
ALL REQUESTS MUST BE RECEIVED BY 5 P.M. ON
TUESDAY OF TEST WEEK.**

I realize the 3 uniform exam dates and time were listed in both the class schedule book and the syllabus, but I have an UNAVOIDABLE, EXTRAORDINARY, DOCUMENTABLE circumstance to be considered.

ID Number:

Name:

Phone Number:

Email Address (required):

Math Course and Section:

Math Instructor:

Conflict:

Notes:

1. You should arrange your work schedule to be off these 3 evenings. If this is not possible, attach a letter from your supervisor on letterhead, with a contact number for verification.
2. If you have a Thursday evening class, attach a copy of your schedule. A copy of your schedule may be obtained from the internet. Go to the OU web page at www.ou.edu. One request is sufficient for the entire semester.
3. If you have a required school function or athletic trip, attach a letter from the faculty sponsor.

This form, along with documentation, should be submitted to Mr. Laniel Gibson (917 PHSC). Alternatively, this form may be submitted to the mathematics department secretary in PHSC 423. The makeup test will be on Thursday at 7:20 a.m., probably in room PHSC 201.

Weekly Schedule for Math 1503

Week One: Introduction to course, Exponents and Radicals (R), Factoring (R)

Week Two: Equations (R), Inequalities (R), Quiz One

Week Three: Distance / Midpoint / Circles, Intro. to Graphs, Quiz Two

Week Four: Functions, Piecewise Functions, Function Arithmetic, Quiz Three

Week Five: Difference Quotient, Review for Exam One, **Exam One**

Week Six: Transformations, Slope

Week Seven: Equations of lines, Parallel / Perpendicular, Quiz Four

Week Eight: Absolute Value, Quadratics, Absolute Value Inequalities, Quiz Five

Week Nine: Division of Polynomials, Review for Exam Two, **Exam Two**

Week Ten: Zeros of Polynomials, Complex Numbers

Week Eleven: Rational Functions, Variation, Composition of Functions, Quiz Six

Week Twelve: Inverse Functions, Exp. / Logs, Log Properties, Quiz Seven

Week Thirteen: Exponential Equations, Review for Exam Three, **Exam Three**

Week Fourteen: Log equations, Applications to Exp / Log, Quiz Eight

Week Fifteen: Linear systems (2 by 2 and 3 by 3), Final Exam Review

Finals Week: **Final exam**

Examples

1. Simplify expressions with exponents.

$$23^0$$

$$3^3 \cdot 3^{10}$$

$$-5^2 \cdot (-5)^2$$

$$(7x)^3$$

$$\left(\frac{c^2}{5^{-1}}\right)^{-2}$$

$$\frac{15x^3y^{-2}}{25x^{-3}y^7}$$

2. Write numbers in scientific notation.

45,700,000,000

0.000543

3. Write numbers in decimal notation.

4.6×10^5 , 3.2×10^{-5} , -7.88×10^{-2} , 5×10^8

4. Simplify.

$$\sqrt{225}$$

$$\frac{\sqrt{150a^5b^3}}{\sqrt{6ab^5}}$$

$$\sqrt{-121}$$

$$\sqrt{15} \cdot \sqrt{75}$$

$$\sqrt{\frac{5}{7}} \cdot \sqrt{\frac{12}{7}}$$

5. Simplify.

A. $5\sqrt{2} - 19\sqrt{2}$

B. $6\sqrt{2} + 3\sqrt{18} - 9\sqrt{8}$

C. $5\sqrt{20x} + 3\sqrt{80x^3}$

6. Rationalize the denominator.

A. $\frac{x}{\sqrt{17}}$

C. $\frac{5\sqrt{7}}{9 - 4\sqrt{3}}$

B. $\frac{\sqrt{6}}{\sqrt{2} - \sqrt{3}}$

D. $\frac{12\sqrt{5}}{6\sqrt{11} - 4\sqrt{13}}$

7. Evakuate:

$$16^{3/4}, 81^{1.25}, 25^{-1.5}$$

8. Simplify: $(8^{2/3} x^{5/6})^6$

$$\frac{(x^{1/3} y^{5/3})^{-2}}{x^{1/3} y^{-7/3}}$$

9. The distance, d , in miles, that a person can see at an altitude of h feet is given by $d = \sqrt{\frac{3h}{2}}$.

The Alexandria Lighthouse (one of the seven ancient wonders) was 384 feet tall. How far could you see from that height?

Examples:

1. Factor each of the following completely:

a) $18x^3 - 24x^2$ b) $16x^2 - 49$ c) $x^2 - 7x - 30$

d) $27 + 8x^3$ e) $2x^3 - 10x^2 + 9x - 45$ f) $2x^3 - 18x$

g) $3x^4 - 192x$ h) $16x^4 - 81$ i) $x^3 - 3x^2 - 25x + 75$

j) $(x + 6)^2 - 25y^2$ k) $x^4 - 13x^2 + 36$

2. Multiply and simplify:

$$\frac{x^2 - 3x - 10}{x^2 - 6x - 7} \cdot \frac{x^3 + x^2}{x^2 + 2x}$$

$$\frac{x^2 - x - 12}{9 - x^2} \times \frac{x^2 + 4x - 21}{x^2 - 4x}$$

3. Divide and simplify:

$$\frac{3x^2 + 6x}{x^2 - 7x - 8} \div \frac{3x^2}{x^2 + 3x + 2}$$

$$\frac{x^2 - 144}{x^2 + 6x} \text{ divided by } \frac{x^2 - 12x}{x^2 - 36}$$

Lesson R3 – Equations

1. Solve for x .

$$2[4(x + 1) - 5] - 7(2 - x) = -11$$

$$\frac{3}{x} = 2\left(\frac{5}{x} - 1\right)$$

2. Find the solution set for each of the following:

a) $6(3 - 2x) = 4(7 - 3x)$

b) $3 + 3(7 - 6x) = 2(12 - 9x)$

c). $4t - 9 = 9t + 1$

3. Solve an equation for one variable in terms of the others.

a) Solve for the variable X : $M = T - 4LX$

b. Solve for the variable Y : $K = P - (3T) / Y$

4. Solve quadratic equations by factoring or the quadratic formula..

a. $x^2 - 8x = -7$

b. $(m + 2)^2 = 7$

c. $2r^2 + 5r = 3$

5. Solve radical equations.

i. $\sqrt{6 + 2x} = \sqrt{3x + 10}$

iii. $\sqrt{11x - 28} = x$

ii. $\sqrt{x + 5} = 2x$

6. Solve these rational equations:

A. $\frac{3x - 5}{x^2 - 9} = 1$

B. $\frac{4}{x} + \frac{8}{x - 2} = \frac{5}{3}$

7. Solve application problems.

- i. A ball is thrown straight upward at an initial speed of 20 ft/sec. Its height is given by the equation $h = -16t^2 + 20t$, where h is in feet. Find the time when the ball hits the ground.

Lesson R4 – Inequalities

1 Write sets in interval and inequality notation.

A. $(-3, \infty)$

B. $(4, 9]$

C. $-15 < x \leq 3$

D. $x > 7$

E. $x \leq -1$

2. Solve linear inequalities.

F. $5x < 10$

G. $6 \leq 8 - 2x < 15$

K. $15 - \frac{1}{3}x \leq 22$

H. $\frac{3x}{2} + \frac{1}{3} \geq \frac{7x}{4} - \frac{23}{2}$

I. $7 - 3x > 2x - 12$

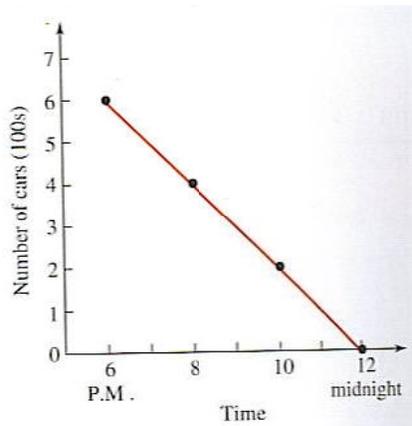
L. $21 - x < -16$

J. $\frac{2}{x} > 8$

M. $\frac{5}{x-2} < \frac{9}{2x+7}$

1. Interpret graphs.

The graph below shows the number of cars in a mall parking lot. How many cars were in the lot at 8 p.m.?



2. Find the distance between two points.

- A. $(3, -4)$ and $(-2, 8)$ B. $(-16, 24)$ and $(-8, -10)$

3. Find the midpoint of a line segment.

Find the midpoint of the line segments given by the points in the previous problem.

4. Given the line segment AB with midpoint M, if $A = (-5, 17)$ and $M = (8, 2)$, then find the coordinates of the point B.

▲ 5. Find the center and radius of each circle:

A. $(x - 8)^2 + (y + 11)^2 = 49$

B. $(x + 5)^2 + y^2 = 144$

C. $x^2 + (y - \frac{5}{6})^2 = \frac{81}{121}$

D. $x^2 + y^2 + 16x - 22y - 40 = 0$

E. $x^2 + y^2 - 14x + 26y + 22 = 0$

F. $x^2 + y^2 + 11x - 36y - 86.75 = 0$

▲ 6. Find the equation of the circle given the endpoints of the diameter to be $(-4, 18)$ and $(8, 34)$

1. Find the x-intercept(s) and y-intercept(s) , if any, for each of the following:

a.) $4x - 5y = 20$

b.) $4x^2 - 9y^2 = 36$

c.) $4x + y^2 = 100$

d.) $\frac{1}{2}x - \frac{1}{4}y = 9$

e.) $x^2 - y^3 = 8$

2. What type of symmetry? (X-axis or Y-axis or origin or not symmetric)

a.) $4x + 7y^2 = 9$

b.) $x^4 + 3y^2 = 1$

c.) $y = 5x$

d.) $y = 5x + 2$

e.) $3xy = 11$

f.) $y = x^2 - 2$

3. Find the equation of each of the following lines:

a) A horizontal line that passes through the point $(9, -4)$

b) A vertical line that passes through the point $(-1, 4)$

c) A horizontal line that passes through the origin

d) A vertical line with an x-intercept of 9

e) A vertical line that passes through the point $(0.6, 1)$

4. Sketch a graph of each of the following:

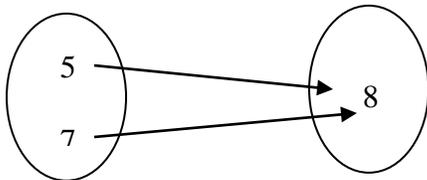
a) $y = -4$

b) $x = 3$

1. Identify the domain and range of a relation.

A. $\{(1,2),(-4,7),(0,\pi)\}$

b.



C	.	X	3	4	-1	6	3	9
		Y	9	9	0	1	-9	18

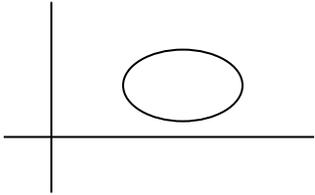
D. $y = x^2$

E. $y = x^2 + 11$

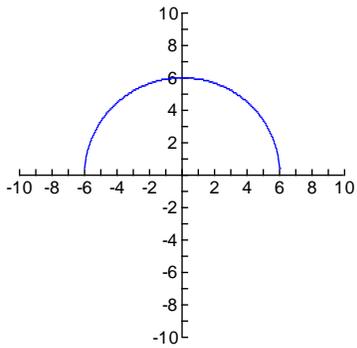
2. Determine if the relations above are functions.

3. Graph $f(x) = \frac{1}{2}x - 5$.

4. Use the Vertical Line Test to identify if this is a function.



5. Find the domain and range of a function from its graph.



Lesson 1.4 – Function Notation

1. Given $f(x) = 2x + 5$, evaluate f at the following values: 0, -2 , k , $t+1$, $x-2$, $x+h$

2. Given $f(x) = 5x - x^2$, find $f(2)$, $f(-3)$, $f(2k)$, $f(-3k^2)$ and $f(2x+h)$

3. Find the domain of each function in interval notation:

A) $f(x) = \sqrt{3x - 12}$

B) $g(x) = \frac{x-4}{\sqrt{2x+10}}$

C) $h(x) = 3 - \frac{2}{4x-2}$

4. Given that $f(x) = \begin{cases} 3x - 1 & \text{if } x < -1 \\ 2x^2 & \text{if } -1 \leq x < 1 \\ 5 - 2x & \text{if } x \geq 1 \end{cases}$, then find the following:

$f(0)$ and $f(-1)$ and $f(\frac{1}{2})$ and $f(2)$ and $f(1)$ and $f(-3)$

5. Given $f(x) = \begin{cases} 8x - 4x^2 & \text{if } x < 1 \\ 3x + 1 & \text{if } 1 \leq x < 3 \\ 15 - 2x & \text{if } x \geq 3 \end{cases}$, then find :

$f(2)$, $f(-\frac{1}{2})$, $f(3)$, $f(-1)$, $f(\frac{3}{2})$

6. Sketch: $y = \begin{cases} 1 - 3x & \text{if } x \leq 0 \\ 2x + 1 & \text{if } 0 < x \leq 2 \\ 8 - x & \text{if } x > 2 \end{cases}$

Lesson 1.5 – Function Arithmetic

1. Given $f(x) = 3x^2$ and $g(x) = \frac{2x-1}{3}$ and $h(x) = 14 - 3x$, then find:

$f + g(5)$ and $f - h(-2)$ and $gh(2)$ and $\frac{h}{f}(-1)$ and $fh(x)$

and $g + h - f(-1)$ and $\frac{fg}{h}(0)$ and $\frac{g}{h}(x)$

2. For each of the following, find $\frac{f(x+h) - f(x)}{h}$

A. $f(x) = 7 - 3x$

B. $f(x) = 2x^2 - 5$

C. $f(x) = 4 - 7x - x^2$

D. $f(x) = 6x - 9x^3$

3. For $f(x) = 3x^2 - x - 2$, find $\frac{f(x) - f(2)}{x - 2}$

4. For $f(x) = 4x - x^2$, find $\frac{f(x) - f(6)}{x - 6}$

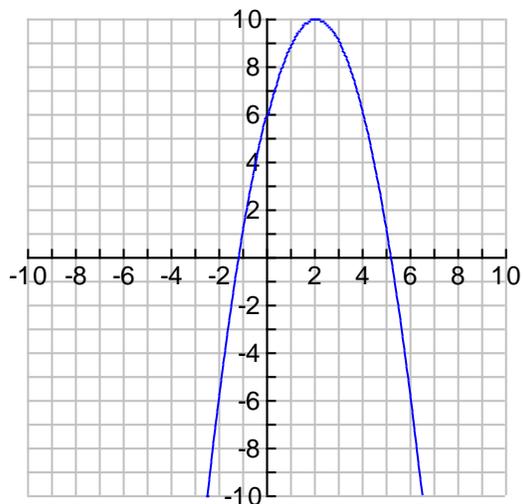
5. For $g(x) = 2x^3 - 5x^2 + 9x - 11$, find $\frac{f(3) - f(-1)}{4}$

6. Find the average velocity of a particle with distance function $f(t) = 2t^3 - 4t$ from

A) 5 to 6 seconds

B) 5 to 5.01 seconds

1. Identify intervals on which a function is increasing, decreasing or constant.
Also indicate any local maximum or minimum.



2. Determine if a function is even, odd, or neither.

A. $y = 5x + 7$

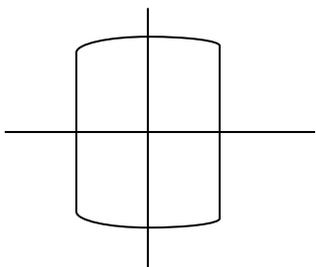
B. $y = x - 3x^3$

C. $y = 4 + 9x^2$

D. $y = |x - 2|$

E. $y = |x| + 3$

3. Determine the symmetry of graphs.



4. Using the graph on Problem Number One, answer each of the following:
[assume the name of the function is $y = f(x)$]

A. Estimate the zeros of that function

B. Estimate the value of $f(4)$

C. Estimate the y-intercept

Lesson 1.7 – Translations

1. Graph functions with vertical shifts.

Graph $f(x) = x^2 - 3$, $g(x) = x^2 - 1$.

2. Graph functions with horizontal shifts.

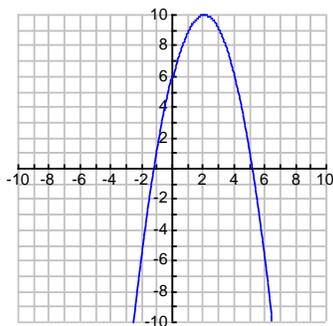
Graph $h(x) = (x+2)^2$, $j(x) = (x-5)^2$.

3. Graph functions with vertical and horizontal shifts.

Graph $f(x) = (x-2)^2 - 4$

4. Graph reflections of graphs.

For function g below, sketch the graph of $g(-x)$ and $-g(x)$



5. Graph functions with vertical stretching or shrinking.

Graph $f(x) = 2x^2$, $g(x) = \frac{x^2}{3}$

6. Graph functions with horizontal stretching or shrinking.

Graph $f(x) = (2x)^2$ and $g(x) = \left(\frac{1}{2}x\right)^2$

7. Given that $f(6) = 11$, find each of the following:

A. Find $g(4)$ if $g(x) = 3f(x+2) - 5$

B. Find $h(3)$ if $h(x) = -4f(2x) + 1$

Review of Chapter One

1. Find the distance between the points $(-3, -2)$ and $(-51, 12)$.
2. Find the midpoint of the line segment joining $(3, 1)$ and $(9, -7)$.
3. If $f(x) = 7x - x^2$, then find $f(-2)$ and $f(-3k^2)$.
4. If $f(x) = 11 - x - 2x^2$, then find $\frac{f(x+h) - f(x)}{h}$
5. What type of symmetry does the graph of $y = 3x - 2x^3$ have?
6. Is $y = \frac{2}{x^2} + |x|$ an even or an odd function or neither?
7. What is the domain and range of the function $y = 2\sqrt{x+3} - 5$?
8. If $f(x) = 7x - 2$ and $g(x) = 4 - x^2$, then find:
 $f + g(x)$ and $g - f(-3)$ and $fg(1)$ and $\frac{f}{g}(2)$
9. If $f(x) = \begin{cases} 5x & \text{if } x \leq 0 \\ 10 - 2x & \text{if } 0 < x \leq 4 \\ \frac{1}{2}x & \text{if } x > 4 \end{cases}$, then find:
 $f(2)$ and $f(-1)$ and $f(4)$ and $f(0)$ and $f(1)$
10. If $f(x) = 2x^2 + 5x$, then find $\frac{f(x) - f(2)}{x - 2}$

Answer Key for Review for Chapter One

1. 50

2. (6, -3)

3. -18 and $-21k^2 - 9k^4$

4. $-1 - 4x - 2h$

5. symmetric about the origin

6. even function

7. domain: $[-3, \text{infinity})$ range: $[-5, \text{infinity})$

8. $7x + 2 - x^2$ and -24 and 15 and undefined

9. 6 and -5 and 2 and 0 and 8

10. $2x + 9$

1. Find the slope of each line:

A. The line containing the points (1, -1) and (4, -2).

B. The line containing the points (-3, -6) and (-8, 14)

C. The line given by $f(x) = -9x + 7$

D. The line with equation $18x = 11 - 10y$

E. The line with equation $x = 2$

F. The line with equation $6y + 24 = 0$

2. Find the equation of a line in point-slope form.

A. The line containing the points (1, -1) and (4, -2). Then put this line in standard form.

B. Find the equation of the line with slope 5 passing through (1, -2) in standard form..

C. Find equation of the line with slope $\frac{5}{7}$ and passes through (4, 7) in standard form.

D. Find the equation of the line with no slope and passes through (9, 15).

▲ 3. Find the equation of the line that passes through the point $(8, -11)$ and:

A) is parallel to the line with equation $7x - 15y - 119 = 0$

B) is perpendicular to the line with equation $9x + 5y - 10 = 0$

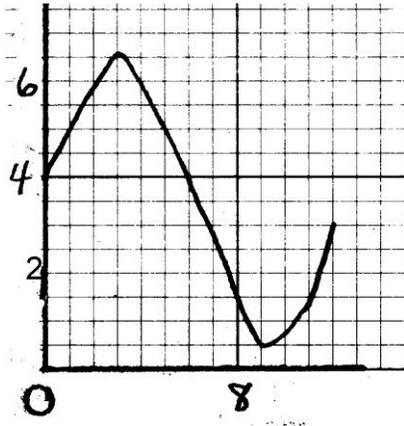
4. Solve application problem.

Jim buys a new car for \$15,000. After six years, the car is worth \$4000. Assuming linear depreciation, find the equation that models the value of the car. What was the value of the car after 2 years?

5. Find the average rate of change of $f(x) = x^3 - x + 3$ between 1 and 3.

6. Find the average rate of change of $f(x) = 5x - 3\sqrt{x+5}$ from $x = -1$ to $x = 11$

7. Find the average rate of change below between 3 and 9 of the function below.



8. Find the average rate of change between 1999 and 2002 of the profit function shown

Year	1999	2000	2001	2002
Profit	15,525	18,375	12,300	14,950

9. Find the equation of the line that passes through $(-4, 1)$ and is:

A) parallel to the line $6x - 12y = 19$

B) perpendicular to the line $y = -4x + 11$

1. Find the solution set for each equation:

A. $|4x - 8| = 0$

B. $|2x - 13| = 27$

C. $4|3x - 19| + 15 = 3$

H. $|6x + 30| = 4x$

D. $|29 - \frac{1}{2}x| = 11$

E. $|4x - 7| = |2x + 11|$

I. $|17x + 55| = -4$

F. $|2x - 11| = x - 4$

G. $|3x + 5| = 2x + 3$

J. $|3x + 5| = |3x + 13|$

2. Sketch each of the following:

A. $y = |x - 1| + 2$

B. $y = -|x|$

1. Graph quadratic functions.

A. $f(x) = (x-2)^2 + 3$

C. $y = -2x^2 - 8x + 9$

B. $f(x) = x^2 + 6x - 5$

2. Find the extreme value of the functions in the previous problem, and identify them as a maximum or minimum.

3. Find the extreme value of $g(t) = t^2 - 3t + 1$, and identify it as a maximum or minimum.

4. A ball is thrown straight upward at an initial speed of 20 ft/sec. Its height is given by the equation $h = -16t^2 + 20t$. Find the maximum height of the ball.

5. Given the quadratic $y = ax^2 - 4x + 13$, find the value of a if the vertex is located at the point $(1, 11)$.
6. Find the equation of the quadratic that has a vertex at the point $(3, -2)$ and it also passes through the point $(5, 10)$.
7. Suppose a rancher decides to fence an area next to a river. That way, he does not have to fence the side next to the river. What dimensions will maximize the area if he must use 1200 feet of fencing? What is the maximum area?
8. Use the quadratic formula to find the roots of the following:
- A. $5x^2 + 8x + 2 = 0$ B. $2x^2 - 7x + 3 = 0$

9. Find the number of real roots in each of the following:

A. $3x^2 - 5x + 3 = 0$

B. $5x^2 + 50x + 125 = 0$

10. Find the equation of each parabola:

A. Find the equation of the parabola that has its vertex at $(-1, 4)$ and also passes through the point $(1, 16)$

B. Find the equation of the parabola with vertex at $(2, 8)$ and it also passes through the origin.

Lesson 2.4 – Inequalities with Absolute Value and Quadratics

1. Find the solution set of each of the following inequalities:

A. $|2x - 7| < 15$

B. $|3x + 5| \geq 23$

G. $4|2x - 19| + 8 \leq 20$

C. $|19 - 2x| \leq 11$

D. $|3x| > 15$

H. $|9 - \frac{2}{3}x| > 15$

E. $4|\frac{1}{3}x + 5| < 24$

F. $|4x - 27| < -2$

2. Find an absolute value inequality whose solution set is $[-18, 46]$

3. Find the solution set for each of the following inequalities:

A. $X^2 - 18 < 7X$

B. $2T^2 - T \leq 3$

C. $(4x - 3)(7x + 9) \geq 0$

D. $X^2 > 9X$

E. $y^2 + y < 20$

Lesson 2.5 – Regression (optional)

1. Given the following set of data:

X	2	6	9	11	15	17	21	28	30	36
Y	1	9	16	27	35	40	48	60	66	75

Answer each of the following:

- A. What is the line of best fit?
- B. What is the slope of the line of best fit?
- C. What is the predicted value of Y when $X = 50$?
- D. What is the predicted value of X when $Y = - 10$?

2. Given the following set of data:

ACT	18	21	22	24	25	27	28	30	32
College GPA	2.1	2.4	2.2	2.5	2.7	2.9	2.8	3.4	3.7

Answer each of the following:

- A. What is the line of best fit?
- B. What is the predicted GPA for an ACT score of 16?
- C. What is the predicted ACT score for a GPA of 3.9 ?

Review for Chapter Two

- 1) Find the slope of the line passing through $(-4, 9)$ and $(-7, -3)$.
- 2) Find the slope of the line with equation $11 - 2x = 4y$.
- 3) Find the equation of the line in standard form that passes through $(-3, 7)$ and $(-1, -11)$.
- 4) Find the average rate of change of $f(x) = 2\sqrt{x-1} + 5$ from $x = 5$ to $x = 10$.
- 5) Find the solution set for the equation: $|19 - 2x| = 3$
- 6) Find the equation of the line in standard form that passes through the point $(13, -2)$ and is perpendicular to the line with equation $2x - 5y = 19$.
- 7) Find the solution set in interval notation for the inequality:
$$|5x + 9| \leq 54$$
- 8) Find the vertex of the parabola $y = -\frac{1}{4}x^2 - 6x + 29$
- 9) Find the equation of the parabola with vertex at $(5, -2)$ and it also passes through the point $(2, 16)$.
- 10) Find the solution set in interval notation for the inequality:
$$3|5 - 2x| - 17 > 16$$
- 11) Find the minimum y-value for the parabola $y = 4x^2 - 24x + 9$
- 12) Indicate the number of real roots for the equation: $5x^2 + 7 = 11x$

Answer Key for the Review for Chapter Two

1) 4

2) $\frac{1}{2}$

3) $9x + y + 20 = 0$

4) $\frac{2}{5}$

5) $x = 11$ and $x = 8$

6) $5x + 2y - 61 = 0$

7) $[-\frac{63}{5}, 9]$

8) $(-12, 65)$

9) $y = 2(x - 5)^2 - 2$

10) $(-\infty, -3) \cup (8, \infty)$

11) -27

12) no real roots

Lesson 3.1 – Graphs of Polynomials

1) Which of the following are polynomial functions?

$$f(x) = 6x^3 - 9x^2 + 1$$

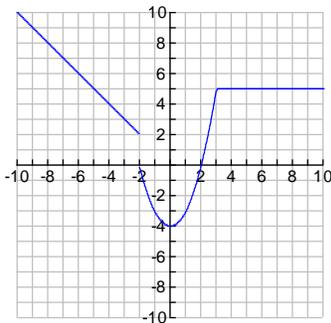
$$g(x) = \sqrt[3]{x^2 + 5}$$

$$M(x) = 6x + x^{-3} + 15$$

$$H(x) = \frac{3x - 9}{2x + 7}$$

$$T(x) = \frac{2}{3}x^2 - 8x + 13$$

2) Describe why the graph below could not be the graph of a polynomial function.



3) Identify the end behavior of polynomial functions.

$$f(x) = -5x^3 - 4x + 1$$

$$G(x) = 8x - 7x^4$$

4) Find the zeros of a polynomial function.

$$p(x) = x^6 - 20x^4 + 64x^2$$

5) Find the multiplicity of each zero in problem 4.

6) Analyze the graph of a polynomial function.

For $f(x) = x^4 + 2x^3 - 8x^2$, find

i. all intercepts

ii. all zeros

iii. the end behavior

iv. Graph this function.

7) Taylor was given the following set of points for a certain polynomial:

X	0	1	2	3	4	5
P(X)	-4	-2	3	7	12	19

Taylor insisted that there is a number, k , between $X = 1$ and $X = 2$ such that $P(k) = 0$. What reason could Taylor give for her statement?

Lesson 3.2 – Dividing Polynomials; Remainder and Factor Theorems

1. Divide polynomials by long division.

A. Divide $x^4 - 3x^3 + 5x^2 - 8x + 1$ by $x + 3$.

B. Divide $x^5 - 2x^4 + x^2 - x - 9$ by $x^2 - 2$.

2) Use synthetic division to divide polynomials. [answer in form: $Q(x) + \frac{R}{x+a}$]

A) Divide $x^3 + x^2 + x + 1$ by $x - 1$.

B) Divide $3x^4 - 7x^3 + 9x - 11$ by $x + 1$

C) Divide $5x^4 - 9x^3 - 4$ by $x + 4$.

D) Divide $x^5 - 2x^2 + 1$ by $x - 1$

E) Divide $2x^5 - 3x^3 + 7x - 9$ by $x - 2$

3) Factor $2x^3 - x^2 - 41x + 70$. (Hint: 2 is a zero.)

4) Find the remainder for each using the Remainder Theorem:

A) $4x^3 - 7x^2 + 5x + 3$ divided by $x + 1$

B) $5x^6 - 7x^3 + x - 3$ divided by $x - 1$

Lesson 3.3 – Zeros of Polynomials

1. Find all possible rational zeros of each polynomial:

A. $P(x) = 3x^3 - 5x + 4$.

B. $P(x) = 10x^4 + x^3 - 14x^2 - 35x + 18$

C. $P(x) = 12x^4 - 9x^2 + 7x - 3$

2. Factor the following: $x^4 - 2x^3 - 19x^2 + 32x + 48$

(use of a calculator is permitted on this problem)

3A. Factor the following: $x^3 - 3x^2 - 34x - 48$

(use of calculator is permitted)

4. Find the zeros of: $y = x^4 - x^3 - 18x^2 + 16x + 32$

(use of a calculator is permitted on this problem)

1. Add or subtract complex numbers.

A. $(4 + 8i) + (5 - 12i)$

B. $(7 - 11i) - (9 - 8i)$

2. Multiply complex numbers.

A. $(3 - 2i)(-5 + 7i)$

B. $(3 - 4i)^2$

C. $8i(-7 + 2i)$

3. Divide complex numbers.

$$\frac{4 - 2i}{8 + 3i}$$

$$\frac{6 - 5i}{4 - 3i}$$

$$\frac{-9 + 7i}{i}$$

4. Simplify expressions with negative radicands.

$$\sqrt{-9} \cdot \sqrt{-16}$$

5. Simplify the following expression:

$$\frac{\sqrt{-8}}{\sqrt{-2}}$$

$$\frac{\sqrt{36}}{\sqrt{-16}}$$

6. Find complex roots of quadratic equations.

A. $x^2 + 2x + 5 = 0$

B. $2x^2 - 3x + 2 = 0$

Review for Chapter Three

- 1) Multiply: $(7 - 2i)(5 + 3i)$
- 2) Give all possible rational zeros for $P(x) = 5x^3 - 4x + 6$
- 3) Find the remainder when $5x^4 - 7x + 8$ is divided by $x - 2$.
- 4) Divide: $\frac{6-15i}{3i}$
- 5) Which of the following is a zero of $P(x) = 7x^4 + 2x^3 - x - 6$?
A) $x = 2$ B) $x = -3$ C) $x = -1$ D) $x = \frac{3}{7}$

- 6) Divide the following and answer in form of $Q(x) + \frac{R}{x-a}$:

$$\frac{4x^4 - x^3 + 11x - 19}{x+2}$$

- 7) True or False?

Given a polynomial, $P(x)$, with $P(k) = 0$, then $x - k$ is a factor of $P(x)$.

- 8) Find all zeros of $P(x) = \frac{1}{2}x^2 + 3x + 5$
- 9) Evaluate: $\sqrt{-36} \times \sqrt{-4} \times \sqrt{-25}$
- 10) Find a factor of $P(x) = 2x^3 + x^2 - 10x - 33$

Answer Key for Review for Chapter Three

1) $41 + 11i$

2) $1, -1, 2, -2, 3, -3, 6, -6, \frac{1}{5}, -\frac{1}{5}, \frac{2}{5}, -\frac{2}{5}, \frac{3}{5}, -\frac{3}{5}, \frac{6}{5}, -\frac{6}{5}$

3) 74

4) $-5 - 2i$

5) $x = -1$

6) $4x^3 - 9x^2 + 18x - 25 + \frac{31}{x+2}$

7) True

8) $-3 + i$ and $-3 - i$

9) $-60i$

10) $x - 3$

1. Determine the domain of this rational function.

$$g(x) = \frac{x^2 - 2x + 5}{x^2 - 2x - 3}$$

2. Determine horizontal asymptotes and the y-intercept.

A. $f(x) = \frac{x+2}{2x-3}$

B. $g(x) = \frac{x-9}{x^2-9}$

C. $Y = \frac{4x+8}{x}$

D. $f(x) = \frac{16x-11-8x^2}{8-4x^2+5x}$

3. For each of the following find:

i) horizontal asymptote ii) any vertical asymptotes

iii) x-intercept(s) iv) y-intercept(s)

A) $y = \frac{x^2 - x - 2}{x^2 - 4}$

B) $y = \frac{2x}{5 - 6x}$

C) $f(x) = \frac{8 - 6x}{2x + 1}$

D) $y = \frac{x^2 - 4}{9 - x^2}$

E) $y = \frac{-5x^2}{x^2 - 49}$

F) $g(x) = \frac{-4x}{1 - 14x}$

4) Find a rational function with the following characteristics:

- a) Vertical asymptote is $x = -9$
- b) Horizontal asymptote is $y = 7$
- c) X-intercept is $(-5, 0)$

Lesson 4.2 – Graphs of Rational Functions

1) Graph rational functions. Also state: VA , HA, x-int, and y-int.

$$f(x) = \frac{x-2}{x+3}$$

$$Y = \frac{3}{x-5}$$

$$g(x) = \frac{x}{x^2-9}$$

$$Y = \frac{8-2x}{x-4}$$

$$y = \frac{x^2-4}{x^2-9}$$

1. Use variation to solve applied problems.
 - A. The volume of a cylinder is directly proportional to its height. A cylinder with height 16 cm has volume 250 cm^3 . Find the volume of a cylinder with height 43 cm.

 - B. The volume of a gas is inversely proportional to its pressure. A certain gas has volume 3L when the pressure is 2.5 atm. Find the volume of the gas if the pressure is increased to 4 atm.

 - C. The volume of a gas in liters varies inversely as the pressure and directly as the temperature (measured in degrees Kelvin). If a certain gas occupies 4.2 L at a temperature and pressure of 300 K and 15 newtons per cc, find the volume when the temperature is increased to 350 K and pressure to 20 newtons per cc.

 - D. The stopping distance for a car on wet concrete varies directly as the square of its speed. A car traveling 35 mph can stop in 100 feet. What is the stopping distance for a car traveling 50 mph under the same conditions?

2. Solve rational inequalities.

A. $\frac{x-3}{x+2} \geq 0$

B. $\frac{x-2}{x+1} \leq 0$

C) $\frac{t+1}{3t-7} < 3$

D. $\frac{x+4}{x-1} < 2$

3. Write the equations for each of the following:

A) The variable X varies inversely as the cube of Y and directly as the square root of W.

B) The square of the variable Y varies directly as the cube root of M and the square root of L and inversely as the variable K.

C) The variable K varies inversely as the cube of M and directly as the square of P.

Review for Chapter Four

- 1) Name the horizontal asymptote for $y = \frac{18-6x}{9x+3}$
- 2) Name the vertical asymptotes for $y = \frac{6x-24}{2x^2-x}$
- 3) Which of the following rational functions has a hole?

A) $\frac{x^2-4}{x^2-4x}$

B) $\frac{x^2-x^3}{x^2+x-2}$

C) $\frac{4x}{4-2x}$

- 4) Write the equation for the following:

The square root of the variable Y varies inversely as the cube of the variable X.

- 5) Find the solution set for this inequality in interval notation:

$$\frac{5x+15}{2x-4} \geq 0$$

- 6) Find the x – intercept for the function $y = \frac{4x+48}{-2x}$
- 7) The square of the variable X varies inversely as the square root of Y and directly as the variable M. When $M = 27$ and $Y = 16$, then $X = 9$. Find the value of Y when $M = 7$ and $X = 2$.
- 8) Find the y – intercept for the function $f(x) = \frac{6x+4}{3-2x}$
- 9) Find a rational function whose vertical asymptote is the y – axis and whose horizontal asymptote is the x – axis.

Answer Key for the Review for Chapter Four

1) $y = -\frac{2}{3}$

2) $x = 0$ and $x = \frac{1}{2}$

3) B

4) $\sqrt{Y} = \frac{k}{x^3}$

5) $(-\infty, -3]$ union $(2, \infty)$

6) $(-12, 0)$

7) 441

8) $(0, \frac{4}{3})$

9) $y = \frac{x-2}{x^2}$ [many different correct answers]

1. For $f(x) = 8x - 7$ and $g(x) = 4x - 3x^2$, find:

i. $(f \circ g)(4)$

ii. $(f \circ f)(0)$

iii. $(g \circ f)(-7)$

2. For $f(x) = \frac{1}{x}$ and $g(x) = 4x - 2$, find the following, and the domain of each composition.

i. $(f \circ g)(x)$

ii. $(g \circ f)(x)$

iii. $(f \circ f)(x)$

iv. $(f \circ g \circ f)(x)$

3. Decompose this function.

$$h(t) = \sqrt[3]{2t - 5}$$

4) If the area of a circle is given by $A = \pi r^2$ and the circumference of a circle is given by $C = 2 \pi r$, then find an equation that gives of area of a circle in terms of its circumference.

5) If $f(x) = 4x - 3x^2$ and $g(x) = 2x^3$, then find $f \circ g(-2a^2)$

6. $f(x) = g \circ h(x)$. $f(x) = (2x - 1)^2 - 12x^2 + 20x - 11$ and
 $h(x) = 2x$. Find $g(x)$.

7. If $f(x) = \frac{3x-1}{5}$ and $g(x) = \frac{5x+1}{3}$, then find $f \circ g(x)$ and $g \circ f(x)$.

1. Find the inverse of a one-to-one function.

A. $y = 2x - 6$ Also, verify that your result is the inverse.

B. $y = \frac{4x}{3x - 8}$

C. $f(x) = x^3 - 5$

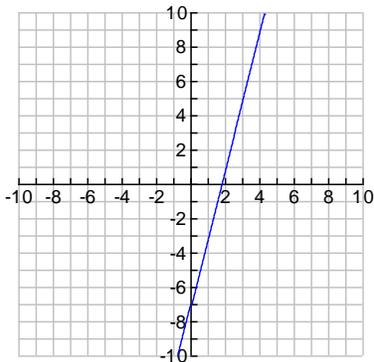
D. $F(x) = 6 + \sqrt{4x + 1}$

E. $y = \frac{x+1}{x-1}$ Also, what is the domain of the inverse?

F. $y = \frac{7x + 11}{9 - 5x}$

G. If $f(x) = 4x^3 + 7x + 8$, then what is $f^{-1}(8)$?

2. Find the inverse of a function graphically.



3. Quick questions:

A. What is the inverse of $f(x) = \frac{3}{x}$?

B. If $f(x) = \frac{2x-1}{7}$, then find $f^{-1}(3)$.

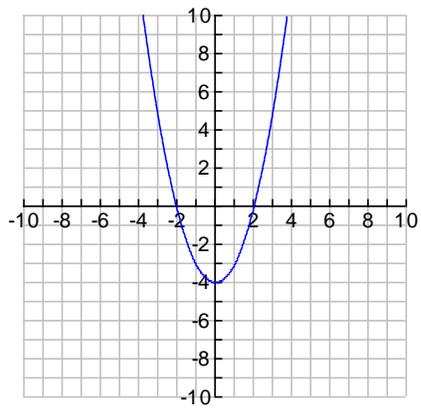
C. Given:

x	2	4	-2	1	0	8	11
$f(x)$	1	0	-3	9	15	6	23

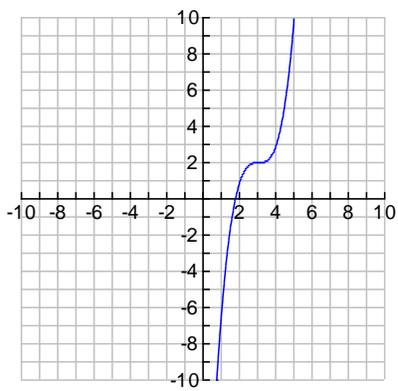
find $f^{-1}(0)$

4. Determine if a function is one-to-one using the Horizontal-Line Test.

A.



B.



1. Find the domain of each of the following:

A. $f(x) = 7 + 3\sqrt{4x + 24}$

B. $y = 5 - \frac{2x}{\sqrt{3x - 15}}$

C. $g(x) = \sqrt{18 - 3x}$

2. Find the domain and range of the following function:

$$y = 6\sqrt{8 - 4x} - 10$$

3. Find the solution set for each of the following:

A. $\sqrt{3x - 2} = 7$

B. $\sqrt{5x + 66} = x$

C. $\sqrt[3]{5x - 6} = -6$

D. $\sqrt{x^2 + 15x + 58} = 2$

4. Find the solution set in interval notation for: $\sqrt{4x + 1} \geq 5$

5. Find the solution set for $\sqrt{2x + 15} < 19$

5. Factor out the common factor in:

$$(3x - 1)^4 + (3x - 1)^2 + 7(3x - 1)^{-2}$$

Review for Chapter Five

$$f(x) = 6x^2 + 5$$

$$g(x) = \frac{7-2x}{5}$$

$$h(x) = \frac{4}{x} + 1$$

$$m(x) = 5\sqrt{x+1}$$

1. Find $f \circ h(-2)$
 2. Find $m^{-1}(30)$
 3. Find $g^{-1}(x)$
 4. Find the domain of $m(x)$
 5. Find $f \circ g(x)$
 6. Find $m \circ g \circ f(1)$
 7. Find $h^{-1}(x)$
-
8. If $f(x) = g \circ h(x)$ and $f(x) = 24x^3 - 12x^2 + 6x - 9$ and $h(x) = 2x$, then find $g(x)$.
 9. Find the solution set for $\sqrt{17x+60} = x$
 10. Find the solution set in interval notation for: $\sqrt{2x+9} \leq 7$
 11. Factor of the common factor in: $x^6 + 8x^3 - x + 11x^{-2} - x^{-5}$

Answer key for the Review for Chapter Five

1. 11

2. 5

3. $\frac{5x-7}{-2}$ or $\frac{7-5x}{2}$

4. $[-1, \text{infinity})$

5. $\frac{24x^2-168x+419}{25}$

6. Undefined

7. $\frac{4}{x-1}$

8. $g(x) = 3x^3 + 3x^2 + 3x - 9$

9. $x = 20$

10. $[-\frac{9}{2}, 20]$

11. $x^{-5} (x^{11} + 8x^8 - x^6 + 11x^3 - 1)$

1. Evaluate: A. $7(2^{8-11})$ B. $e^{2+0.5 \times 6}$

C. $6\left(\frac{2}{3}\right)^{-2}$

2. Graph exponential functions.

A. $f(x) = 3^x$

B. $h(x) = 3^{-x}$

C. $g(x) = 1 + e^x$

3. Convert each of the following to a logarithm:

A. $T = x^5$

B. $\frac{1}{x^2} = P$

C. $\sqrt[5]{x^2} = Y$

4. Convert each logarithm to an exponential:

A. $\log_5 625 = 4$

B. $\log x = 26$

C. $\log_9 x = Y$

5. Graph logarithmic function.

A. $f(x) = \log_3 x$

B. $y = \ln (x + 2)$

6. Find the domain of : $y = \log (3 x + 21)$

7. Find the domain of: $y = 5 + \frac{x+1}{\ln (4 x - 11)}$

8. Find the domain of: $y = \log (x^2 - 81)$

9. Evaluate:

A. $\log_4 64$

B. $\log 10,000$

C. $\log_2 \frac{1}{8}$

D. $\log_b \sqrt{b}$

E. $\log 0.001$

F. $\ln \frac{1}{e^2}$

G. $\log_3 (- 9)$

H. $e^{\ln x}$

I. $\log \frac{1}{\sqrt{10}}$

Lesson 6.2 – Properties of Logarithms

1. Use the properties of logarithms to rewrite expressions.

A. $\ln x^2 y^3$

B. $\log_6 \sqrt{v^3}$

C. $\log(100x^2)$

D.

$$\ln(x^3 - 8) - \ln(x - 2)$$

2. Use the Change-of-Base rule to evaluate the decimal approximation of $\log_7 23$.

3. Expand each of the following”

A. $\log \left(\frac{x^2 \sqrt{y}}{5 t^2} \right)$

B. $\ln \left(\frac{4 x \sqrt[5]{x^2}}{5 y \sqrt{t}} \right)$

4. Write each of the following as one logarithm:

A. $8 \ln x - \frac{3}{2} \ln y - \ln 10 + \ln t - 5 \ln w$

B. $-7 \log x - (2 \log y + \log t) - \frac{4}{5} \log M - \log 5$

5. If $\log_b 2 = 0.6$ and $\log_b 3 = 1.1$ and $\log_b 5 = 1.5$, then find:

A) $\log_b 15$

B) $\log_b 1.5$

C) $\log_b 64$

Lesson 6.3 – Exponential Equations and Inequalities

1. Solve exponential equations.

A. $6^x = 1296$

B. $2^x = 8^{2x-1}$

C. $e^x = 12$

D. $2^{x+5} = 9$

E. $4^{3x+1} = \frac{1}{8^{2x-1}}$

2. Find the solution set for each inequality in interval notation:

A. $2^{7x-5} \leq 16^{2x+9}$

B. $9^{x+1} > 27^{11-2x}$

3. Solve the following equation for the variable x:

$$Y = 5 + e^{4x-13}$$

1. Solve logarithmic equations.

$$\log_3(x+4)=1$$

$$2\log_4 x = \log_4 16$$

$$\log(x^2 - 1) - \log(x - 1) = 2$$

$$\log_3 [\log_5(X)] = 2$$

$$\log_2 x + \log_2 (x - 2) = 3$$

2. Solve the following equation for the variable X:

$$Y = 7 + \log (2 x + 11)$$

3. Find the solution set for each equation:

A. $[\log x]^3 = 4 \log x$

B. $\frac{\log (2 x - 1)}{\log 4} = \log_4 (5 x - 13)$

C. $\log x + \log (x + 21) = 2$

1. Using the initial principal of \$22,000 find each of the following amounts:

A. 3% compounded monthly for 25 years

B. $7\frac{1}{4}\%$ compounded daily for 35 years

C. $5\frac{1}{4}\%$ compounded continuously for 15 years

D. $6\frac{3}{4}\%$ compounded monthly for 65 years

E. 4% compounded semiannually for 18 years

2. A colony of rabbits grows according to the formula $N(t) = 2e^{0.3t}$, where t is in months. How many rabbits will there be after 10 months? How long will it take for the colony to number 25 rabbits?
3. In 2000, the population of a small city was 50,000. By 2006, the population had risen to 53,000. Assuming exponential growth, find the equation that models the population of the town. Estimate the population in 2020.
4. The number of people who have heard a particular rumor is given by $f(t) = \frac{1000}{1 + 4e^{-1.9t}}$, where t is measured in days. How many people will have heard the rumor in one day?
How long will it take 95% of the people to hear the rumor?

Review for Chapter Six

1. Change $9 = x^{0.5}$ to a logarithmic form.
2. Evaluate: $\log_{16} \frac{1}{2}$
3. Find the domain of $y = 8 + \ln(25 - x^2)$ in interval notation.
4. Expand: $\ln\left(\frac{x^2 \sqrt[7]{m^2}}{6y\sqrt{t}}\right)$
5. Find the solution set for this equation: $8^{3x-1} = 16^{2x+17}$
6. Change $\log_x m = 12$ to an exponential form.
7. Find the solution set for this equation:

$$\log_4 x - \log_4(2x - 1) = 2$$

8. If you place \$10,000 into an account drawing 5.5 % interest compounded monthly, then how much would be in the account after 30 years?
9. Find the solution set for this inequality in interval notation:

$$9^{8-7x} \geq 27^{5x+3}$$

10. Write as one logarithm: $4 \ln x - \frac{4}{3} \ln y + \ln 8 - \frac{1}{4} \ln P$
11. Solve the following equation for the variable X:

$$Y = 7 + 10^{5 + \ln x}$$

Answer Key for the Review for Chapter Six

1. $\log_x 9 = 0.5$

2. $-\frac{1}{4}$

3. $(-5, 5)$

4. $2 \ln x + \frac{2}{7} \ln m - \ln 6 - \ln y - \frac{1}{2} \ln t$

5. $x = 71$

6. $x^{12} = m$

7. $x = \frac{16}{31}$

8. \$ 51,873.88

9. $(-\infty, \frac{7}{29}]$

10. $\ln \left(\frac{8x^4}{\sqrt[4]{P} \sqrt[3]{x^4}} \right)$

11. $x = e^{\log(Y-7) - 5}$

Substitution Method

1. Solve systems of equations by substitution.

A.
$$\begin{cases} x - 3y = 2 \\ 6x + 5y = -34 \end{cases}$$

B.
$$\begin{cases} x + y = 2 \\ 3x + y = 0 \end{cases}$$

C. $x + 3y = 11$ and $5x + 2y = 3$

2. Solve systems of equations by addition.

$$D. \begin{cases} 2x - y = 1 \\ 3x + y = 9 \end{cases}$$

$$E. \begin{cases} 4x + 6y = 4 \\ 10x - 3y = 4 \end{cases}$$

3. Recognize inconsistent and dependent systems of equations.

$$F. \begin{cases} y + 1 = 2x \\ y - 1 = 2x \end{cases}$$

$$G. \begin{cases} 0.2x - 0.5y = -1 \\ 2.5y = x + 5 \end{cases}$$

4. Solve application problems.

H. An artist sells decorated shirts in yellow and blue. The yellow ones are \$12 and the blue ones are \$15. On a recent day, 40 shirts were sold for a total of \$549. Determine the number of each type of shirt sold.

I. A widget company has fixed costs of \$10,000 per week. It costs \$5 to produce each widget, which is sold for \$9. Find the cost and revenue functions in terms of n , the number of widgets produced each week. How many widgets must be produced to break even?

1. Solve systems of linear equations with three variables

$$x + y + z = 3$$

A. $2x - 3y - z = -8$

$$-x + y + 5z = -7$$

$$x - 2y - z = 0$$

B. $4x + 6y + z = 17$

$$2x - 8y + 2z = 6$$

2. A child has 20 coins in her bank, worth \$1.55. There is one more dime than quarters; the rest of the coins are nickels. How many of each coin does she have?

3. Find a , b , and c so that the parabola $y = ax^2 + bx + c$ goes through the points $(1, -2)$, $(-2, 7)$, and $(3, 4)$.

1. Solve nonlinear systems.

A. $x - y = 1$
 $x^2 - y = 3$

B. $x^2 + y^2 = 10$
 $x - y = 2$

C.

$$x^2 + y^2 = 6$$
$$x^2 - y^2 = -1$$

2. Solve application problems.

D. The perimeter of a rectangular lot is 124 m. The width is ten less than the square of the length. Find the dimensions of the lot.

E. The product of two numbers is 50 and the sum of their squares is 125. Find the numbers.

1. Solve an inequality in two variables.

A. $x - 2y < 8$

B. $2x + 3y \geq 6$

C. $x^2 + y^2 < 16$

2. Solve a system of inequalities.

D. $x + y < 4$
 $2x - y > 3$

E. $2x + y \leq 5$
 $y > x^2 - 2x + 1$

3. Solve application problems.

A retailer sells two brands of a product, and wants to determine how many of each brand should be kept in stock. Because of the popularity of the deluxe product, the store needs to stock at least twice as many of the deluxe as the regular product. The number of regular product cannot go below 20, and there is room for at most 200 total items. Write an inequality that describes this condition. What is the maximum number of the regular product that can be stocked?

Review for Chapter Eight

1. Solve the following system of equations:

$$14x + 3y = 1$$

$$8x - 5y = 14$$

2. Solve the following word problem:

I have a pile of nickels and dimes. I have a total of 100 coins. The value of these coins is \$7.95 .
How many of each coin do I have?

3. Solve the following system of equations:

$$12x - 3y + 2z = 16$$

$$- 4x + y + 3z = 13$$

$$20x + 7y + z = 3$$

4. Solve the following system of equations:

$$x^2 + y^2 = 5$$

$$x^2 - y^2 = 3$$

Answer key for the Review for Chapter Eight

1. $x = \frac{1}{2}$, $y = -2$

2. 41 nickels and 59 dimes

3. $x = \frac{1}{4}$, $y = -1$, $z = 5$

4. $(2, 1)$ and $(2, -1)$ and $(-2, 1)$ and $(-2, -1)$

Multiple Choice Practice for Preliminary Section

1. Find the solution: $-5 < 2x + 3 < 5$

- A) $(-\frac{5}{2}, 1)$
 - B) $(-1, 1)$
 - C) $(-4, 4)$
 - D) $(-4, 1)$
 - E) None of these
-

2. Simplify: $\frac{t+4}{t-8} + \frac{t-1}{8-t}$

- A) $\frac{2t+3}{t-8}$
 - B) $2t+3$
 - C) $\frac{-1}{8-t}$
 - D) $\frac{3}{t-8}$
 - E) $\frac{5}{t-8}$
-

3. Simplify: $2\sqrt{2} + 5\sqrt{18}$

- A) $-13\sqrt{2}$
 - B) $7\sqrt{20}$
 - C) $10\sqrt{20}$
 - D) $17\sqrt{2}$
 - E) None of these.
-

4. Which of the following is a factor of $5b^4 - 405$?

- A) $b+3$
 - B) $b^2 + 81$
 - C) $b-9$
 - D) $b+9$
 - E) None of these is a factor.
-

5. Factor and simplify: $\frac{m^3 - 27}{m - 3}$

- A) $m^2 + 9$
 - B) $m^2 - 9$
 - C) $m^2 + 3m + 9$
 - D) $m^2 - 3m + 9$
 - E) $(m-3)^2$
-

6. Multiply: $(2a-7)^2$

- A) $4a^2 + 49$
 - B) $4a^2 - 14a + 49$
 - C) $4a^2 - 49$
 - D) $4a^2 - 28a - 49$
 - E) $4a^2 - 28a + 49$
-

7. Divide and simplify: $\frac{a^2 - 16}{18a} \div \frac{a - 4}{6a}$

- A) $\frac{a+4}{3}$
- B) $(a+4)^3$
- C) $3(a+4)$
- D) $a+4$
- E) None of these.

8. Find the solution of $\frac{8x}{x+1} = 4 - \frac{8}{x+1}$.

- A) 1 only
 - B) -1 only
 - C) 1 and -1
 - D) There is no solution.
-

9. A rectangular garden measures 80 feet by 60 feet. A large path of uniform width is to be added along both shorter sides and one longer side of the garden. The designer doing the work wants to double the garden's area with the addition of this path. How wide should the path be?

- A) 10 feet
 - B) 15 feet
 - C) 20 feet
 - D) 25 feet
 - E) None of these.
-

10. Find the solution: $2x - 1 \leq -5$ or $5x + 3 \geq 18$

- A) $(-\infty, -2] \cup [3, \infty)$
 - B) $(-\infty, -3] \cup [2, \infty)$
 - C) $[-2, 3]$
 - D) $[-3, 2]$
 - E) None of these
-

11. Rationalize the denominator: $\frac{\sqrt{5} - \sqrt{2}}{\sqrt{5} + \sqrt{2}}$

- A) $\frac{-2\sqrt{10}}{7}$
- B) $\frac{7 - 2\sqrt{10}}{3}$
- C) $\frac{7 + 2\sqrt{10}}{3}$
- D) $\frac{21 - 2\sqrt{10}}{21}$

12. Write without negative exponents: $\left(\frac{-4x^2}{y^{-2}}\right)^{-3}$

- A) $\frac{64}{x^6y^6}$
 - B) $-\frac{64}{x^6y^6}$
 - C) $\frac{1}{64x^6y^6}$
 - D) $-64x^6y^6$
 - E) $-\frac{1}{64x^6y^6}$
-

13. Rationalize the denominator: $\frac{12}{\sqrt{2}-\sqrt{5}}$

- A) $4(\sqrt{2}-\sqrt{5})$
 - B) $-4(\sqrt{2}-\sqrt{5})$
 - C) $4(\sqrt{2}+\sqrt{5})$
 - D) $-4(\sqrt{2}+\sqrt{5})$
 - E) None of these.
-

14. Simplify: $(5x^{1/2})(7x^{3/4})$

- A) $35x^{5/4}$
- B) $35x^{3/8}$
- C) $35x^{2/3}$
- D) None of these.

15. Factor: $9m(3m-5)^2 + (3m-5)^3$

- A) $(3m-5)^3(9m+1)$
- B) $(3m-5)^2(6m-5)$
- C) $(3m-5)^2(12m-5)$
- D) $(3m-5)(30m^2-70)$
- E) None of these.

16. Which of the following is the correct factorization of $p^3 - 125$?

- A) $(p-5)^3$
- B) $(p-5)(p^2+5p+25)$
- C) $(p-5)(p^2-5p+25)$
- D) $(p-5)(p^2+25)$
- E) None of these.

17. Simplify: $\frac{4x-16}{5x+15} \div \frac{4-x}{2x+6}$

- A) 0
 - B) 1
 - C) $-8/5$
 - D) $-\frac{4(x-4)}{5(x+3)^2}$
 - E) None of these.
-

18. Find the solution of $6 - 5x \leq x - 6$.

- A) $[0, \infty)$
 - B) $[2, \infty)$
 - C) $(-\infty, 2]$
 - D) $(-\infty, 0]$
 - E) There is no solution./ None of these.
-

19. Find the solution of $-5 < 2x + 3 < 17$

- A) $(-4, 7)$
 - B) $(-\infty, 4)$
 - C) $(7, \infty)$
 - D) $(-\infty, -4) \cup (7, \infty)$
 - E) There is no solution./ None of these.
-

20. Simplify: $[(x+1) - y][(x+1) + y]$

- A) $x^2 - y^2 + 1$
 - B) $x^2 - y^2 + 1 + 2x$
 - C) $(x^2 + 1)y^2$
 - D) $-x^2y^2 + 2xy^2 + y^2$
 - E) None of these.
-

Multiple Choice Practice for Chapter One

1. Given $f(x) = \begin{cases} 2x & \text{if } x > 0 \\ x+7 & \text{if } x \leq 0 \end{cases}$, evaluate $f(1) - f(-1)$.

- A) -9
 - B) -4
 - C) 0
 - D) 4
 - E) None of these.
-

2. Find the length of the segment with the endpoints $(-\frac{7}{2}, 3)$ and $(\frac{3}{2}, 5)$.

- A) $\sqrt{29}$
 - B) $\sqrt{21}$
 - C) 7
 - D) $4\sqrt{5}$
 - E) None of these.
-

3. Find the midpoint of the segment with the endpoints $(-\frac{7}{2}, 3)$ and $(\frac{3}{2}, 5)$.

- A) (2,4)
 - B) (5,8)
 - C) (-5,-1)
 - D) (-2,8)
 - E) None of these.
-

4. Given $m(t) = n(t-4)$, which of the following transformations of the graph of n will produce the graph of m ?

- A) Shift up 4 units.
 - B) Shift down 4 units.
 - C) Shift left 4 units.
 - D) Shift right 4 units.
 - E) None of these.
-

5. Find the simplified difference quotient, $\frac{f(x+h)-f(x)}{h}$, for $f(x) = x^2 - x$.

- A) 1
 - B) $2x-1$
 - C) $2x+h-1$
 - D) h
 - E) None of these.
-

6. Find the standard form of the circle with center at $(1, -2)$ and radius 4.

- A) $(x+1)^2 + (y-2)^2 = 16$
 - B) $(x-1)^2 + (y+2)^2 = 16$
 - C) $(x-1)^2 + (y+2)^2 = 4$
 - D) $(x-1)^2 + (y+2)^2 = 2$
 - E) $(x+1)^2 + (y-2)^2 = 4$
-

7. The point $(2, 4)$ lies on the graph of $y = f(x)$. Suppose $g(x) = -2f(x)$. Which of the following points MUST lie on the graph of g ?

- A) $(2, -2)$
 - B) $(2, -8)$
 - C) $(-2, 4)$
 - D) $(-4, 8)$
 - E) More than one of these MUST lie on the graph of g .
-

8. Given $g(x) = -f(x)$, in which way must the graph of f be modified to obtain the graph of g ?

- A) Reflect across the x -axis.
- B) Reflect across the y -axis.
- C) Reflect across both axes.

9. Find the simplified difference quotient, $\frac{f(x+h)-f(x)}{h}$, when $f(x) = x^2 - 2x + 6$.

- A) h
 - B) 1
 - C) $2x + h - 2$
 - D) $2x - 2$
 - E) None of these.
-

10. Given $f(x) = x^2 - 3$ and $g(x) = 4x + 1$, find $f \circ g(x)$.

- A) $x^2 + 4x - 2$
 - B) $4x^3 + x^2 - 12x - 3$
 - C) $4x^2 - 11$
 - D) $16x^3 + 8x - 2$
 - E) None of these
-

11. Find the midpoint of the line segment with endpoints $(1, -6)$ and $(-8, -4)$.

- A) $(-\frac{7}{2}, -5)$
 - B) $(-7, -10)$
 - C) $(-9, -10)$
 - D) $(\frac{7}{2}, 5)$
 - E) None of these.
-

12. Find the equation of the circle with center at $(3, -5)$ and radius 4.

- A) $(x-3)^2 + (y-5)^2 = 4$
- B) $(x+3)^2 + (y-5)^2 = 16$
- C) $(x-3)^2 + (y+5)^2 = 4$
- D) $(x-3)^2 + (y+5)^2 = 16$
- E) None of these.

13. Find the domain of

$$g(x) = \frac{1}{\sqrt{x-3}}$$

- A) All real numbers.
 - B) $[0, \infty)$
 - C) $(0, \infty)$
 - D) $[3, \infty)$
 - E) $(3, \infty)$
-

14. Given functions m and n in the table below, determine the value of $(m-n)(2)$.

x	1	2	3	4
$m(x)$	2	1	4	3
$n(x)$	4	3	2	1

- A) 2
 - B) 0
 - C) -2
 - D) 4
 - E) None of these.
-

15. Name the equation of the horizontal line that passes through $(6, 3)$.

- A) $x = 6$
 - B) $y = 3$
 - C) $x + y = 9$
 - D) $x - y = 3$
 - E) None of these
-

16. The graph of $x^2 - 3y = 7$ is symmetric about the

- A) x - axis
- B) y - axis
- C) origin
- D) nothing

17. Find the x - intercept of $5y - 6x = 60$.

- A) $(10, 0)$
 - B) $(12, 0)$
 - C) $(-12, 0)$
 - D) $(-10, 0)$
 - E) None of these
-

18. Which of the following is a zero of $f(x) = 2x^3 - 5x - 3$?

- A) $x = 1$
 - B) $x = 3$
 - C) $x = -1$
 - D) $x = -3$
 - E) None of these
-

19. If $f(x) = 4x - 1$ and $g(x) = 3x^2$, then find: $\frac{f+g}{f-g}(2)$.

- A) $-\frac{43}{29}$
- B) $-\frac{19}{5}$
- C) $-\frac{17}{7}$
- D) $-\frac{41}{31}$
- E) None of these

Multiple Choice Practice for Chapter Two

1. Find the slope of the line $2x + 4y = 1$.

- A) 2
 - B) -2
 - C) $\frac{1}{2}$
 - D) $-\frac{1}{2}$
 - E) None of these.
-

2. Find the average rate of change of $f(x) = x^2 + 2x - 3$ from -1 to 5 .

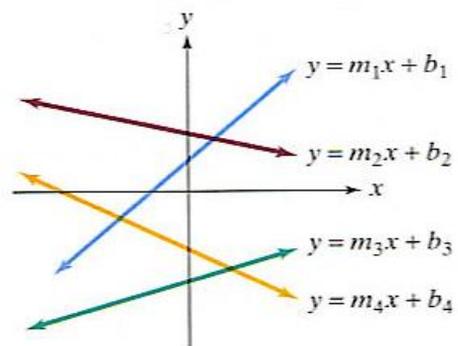
- A) 4.67
 - B) 6
 - C) 9
 - D) 36
 - E) None of these.
-

3. Find the equation of the line that passes through $(6, 2)$ perpendicular to $3x + 2y = 2$.

- A) $3x + 2y = 22$
 - B) $2x + 3y = 18$
 - C) $3x - 2y = 7$
 - D) $2x - 3y = 6$
 - E) None of these.
-

4. Which of the lines shown below has the largest positive slope?

- A) The line with slope m_1 .
- B) The line with slope m_2 .
- C) The line with slope m_3 .
- D) The line with slope m_4 .
- E) More information is needed.



5. Find the equation of the line parallel to $3x - 4y = 8$ that goes through $(4, -9)$.

- A) $y = \frac{3}{4}x - 12$
 - B) $y = \frac{3}{4}x - 6$
 - C) $y = -\frac{4}{3}x - \frac{11}{3}$
 - D) $y = -\frac{4}{3}x - \frac{43}{3}$
 - E) None of these.
-

6. Find the slope of the line through $(3, -7)$ and $(3, 7)$.

- A) $7/3$
 - B) $-7/3$
 - C) 0
 - D) 14
 - E) This line has no slope.
-

7. Find the average rate of change of $f(x) = x^2 - 5$ as x goes from -3 to 3 .

- A) 0
 - B) 4
 - C) 6
 - D) 8
 - E) None of these.
-

8. Find the vertex of $f(x) = 2x^2 - 8x + 9$.

- A) $(1, 3)$
- B) $(2, 1)$
- C) $(4, 9)$
- D) $(-1, 19)$
- E) None of these.

9. Find the solution set for the equation: $|2x + 17| = 11$

- A) $x = 3$
 - B) $x = 3$ and $x = -3$
 - C) $x = 3$ and $x = -14$
 - D) $x = 3$ and $x = -6$
 - E) None of these
-

10. Find the solution set in interval notation:

$$|4x + 15| \leq 43$$

- A) $(-\infty, 7]$
 - B) $[-\frac{15}{4}, 7]$
 - C) $[0, 7]$
 - D) $[-\frac{29}{2}, 7]$
 - E) None of these
-

11. Which line is perpendicular to the line with equation $8x + 6y = 11$?

- A) $3x - 4y = 9$
 - B) $4x + 3y = 17$
 - C) $4x - 3y = 21$
 - D) $3x + 4y = 19$
 - E) None of these
-

12. Find the minimum y-value for $y = 2x^2 + 10x + 17$.

- A) 4.5
- B) 2.5
- C) 54.5
- D) 7
- E) None of these

13. How many real zeros for the function: $f(x) = 5x^2 + 8x + 4$?

A) None

B) one

C) two

14. Find the slope of the line with equation $6y + x = 19$

A) 6

B) -6

C) $\frac{1}{6}$

D) $-\frac{1}{6}$

E) None of these

15. Evaluate: $17 - 5|2 - 6|$

A) 48

B) -3

C) 37

D) -48

E) None of these

16. Find the solution set in interval notation: $x^2 \leq 5x$

A) $(-\infty, 5]$

B) $[0, 5]$

C) $[-5, 5]$

D) $(-\infty, 0]$ union $[5, \infty)$

E) None of these

17. Find the slope of the line with equation $x + 12 = 0$

A) zero

B) 1

C) -12

D) undefined

Multiple Choice Practice for Chapter Three

1. Write $4 - \sqrt{-36}$ in standard form.

- A) -2
- B) 10
- C) $4 - 6i$
- D) $4 + 6i$
- E) None of these.

2. Simplify: $\frac{1+2i}{2-i}$

- A) 1
- B) -1
- C) i
- D) $-i$
- E) None of these.

3. Find the remainder when $2x^5 - 9x^3 + 7x^2 + 1$ is divided by $x+1$.

- A) 0
- B) 1
- C) 15
- D) 19
- E) None of these.

4. Find a polynomial of degree 3 that has roots -4 and $5i$.

- A) $x^3 - 4x^2 - 25x + 100$
 - B) $x^3 + 4x^2 + 25x + 100$
 - C) $x^3 + 4x^2 - 25x - 100$
 - D) $x^3 - 4x^2 + 25x - 100$
 - E) None of these.
-

5. Suppose $x - c$ is a factor of $f(x)$. Which of the following statements is true?

i) $f(c) = 0$ ii) c is a root of $f(x)$.

- A) Neither i nor ii are true.
 - B) The only true statement is i.
 - C) The only true statement is ii.
 - D) Both i and ii are true.
-

6. Which of the following could NOT possibly be a rational root of $f(x) = 5x^9 + 3x^3 + 4x - 7$?

- A) 1
 - B) 5
 - C) 7
 - D) $7/5$
 - E) All of these could be possible roots.
-

7. Simplify: $\sqrt{-2}\sqrt{-8}$

- A) 4
 - B) -4
 - C) $4i$
 - D) $-4i$
 - E) None of these.
-

8. Write $-\frac{45}{6+3i}$ as a complex number in standard form.

- A) $-6 + \frac{1}{3}i$
- B) $-\frac{15}{2} - 15i$
- C) $-6 - 15i$
- D) $-6 + 3i$
- E) None of these.

9. What is the multiplicity of 2 in the polynomial function $f(x) = x^3(x+2)^2(x-2)^4$?

- a. 2
 - b. 3
 - c. 4
 - d. 6
 - e. 9
-

10. TRUE OR FALSE: $x+1$ is a factor of $x^{10}-1$

- A. TRUE
 - B. FALSE
-

11. Find the remainder when $3x^3 - 4x^2 + x - 10$ is divided by $x-2$.

- f. 5
 - g. 21
 - h. -5
 - i. -21
 - j. 0
-

12. Find the vertical asymptote of $f(x) = \frac{x-3}{x+1}$.

- k. $x = -3$
- l. $x = -1$
- m. $x = 0$
- n. $x = 1$
- o. $x = 3$

13. Given $f(x) = 4x^5 + 8x^3 - 4x^2 + 9$, which of the following could NOT possibly be a zero?

- p. 1
 - q. 3
 - r. $4/3$
 - s. 9
 - t. All of these are possible.
-

14. Which of the following best describes the end behavior of $f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_0$, given n is an odd nonnegative integer, and $a_n > 0$?

- A) Rises to the left, rises to the right.
 - B) Rises to the left, falls to the right.
 - C) Falls to the left, rises to the right.
 - D) Falls to the left, falls to the right.
 - E) More information is required.
-
-

15. What is the degree of $P(x) = 5x^3 - 6x^2 - 9x^5 + 8x - 17$?

- A) 3
 - B) 11
 - C) 5
 - D) -9
 - E) None of these
-
-

16. Which is a factor of $P(x) = x^5 + x^4 + x^3 - x^2 - x - 1$?

- A) $x + 1$
 - B) $x - 1$
 - C) x
 - D) None of these
-

17. Which of the following is a polynomial?

- A) $x^2 + \frac{1}{x} + 2$
 - B) $4x + 5x^{-3} + 7$
 - C) $x + \sqrt{x} - 11$
 - D) $\frac{3x+9}{2x}$
 - E) None of these are polynomials
-
-

18. Evaluate: $(a + bi)(a - bi)$

- A) $a^2 + b^2$
 - B) $a^2 - b^2$
 - C) $2a - 2bi$
 - D) $a^2 - b^2i$
 - E) None of these
-
-

19. Divide: $\frac{x^3 + x^2 + 2x - 7}{x+2}$

- A) $x^2 + 3x + 8 + \frac{9}{x+2}$
 - B) $2x^2 + 5x + 12 + \frac{17}{x+2}$
 - C) $x^2 - x - \frac{7}{x+2}$
 - D) $x^2 - x + 4 - \frac{15}{x+2}$
 - E) None of these
-

Multiple Choice Practice for Chapter Four

1) Find the vertical asymptote(s) of $F(x) = \frac{x+2}{x-3}$.

- A) $x = -2$
 - B) $x = 0$
 - C) $x = 1$
 - D) $x = 3$
 - E) None of these/ There is no vertical asymptote.
-
-

2. The stopping distance for a car on wet concrete is directly proportional to the square of the speed of the car. At 20 mph, the distance is 100 feet. Determine the stopping distance for a car going 35 mph.

- A) 140 feet
 - B) 175 feet
 - C) 306.25 feet
 - D) 350 feet
 - E) None of these.
-

3. Find the solution of $\frac{3x}{x-2} > 1$.

- A) $(-\infty, -1) \cup (2, \infty)$
 - B) $(-\infty, 0) \cup (2, \infty)$
 - C) $(-1, 2)$
 - D) $(0, 2)$
 - E) None of these.
-

4. The length L of a pendulum is directly proportional to the square of the time T required for a pendulum to swing back and forth one time. A two-foot pendulum requires 1.57 seconds to swing back and forth. Find the time required for a 5-foot pendulum to swing, to the nearest hundredth of a second.

- u. 2.48 sec
 - v. 4.06 sec
 - w. 6.37 sec
 - x. 20.28 sec
 - y. None of these.
-
-

5. Find the solution of $\frac{x-5}{x} > 0$.

- a. $(-\infty, -5) \cup (0, \infty)$
 - b. $(-\infty, 0) \cup (5, \infty)$
 - c. $(0, 5)$
 - d. $(-5, 0)$
 - e. None of these.
-

6. Find the horizontal asymptote of $F(x) = \frac{7x^2 - 2x - 104}{x^2 - 4}$.

- f. $y = 7x + 26$
 - g. $y = 3x + 7$
 - h. $y = 4$
 - i. $y = 7$
 - j. There is no slant asymptote.
-
-

7. Find the y – intercept of $f(x) = \frac{6x-12}{4-x}$

- A. (0 , - 6)
 - B. (0 , 4)
 - C. (0 , - 3)
 - D. (0 , 2)
 - E. None of these
-

8. Simplify: $\frac{\frac{1}{x} - \frac{2}{y}}{1 - \frac{5}{xy}}$

- A. $\frac{y-x}{-4}$
- B. $\frac{y-x}{xy-5}$
- C. $\frac{y-2x}{xy-5}$
- D. $\frac{2y-x}{xy-5}$

E. None of these

9. Which of the following is not in the domain of $f(x) = \frac{3x-6}{x-x^2}$?

- A. $x = 2$ B. $x = -1$ C. $x = 1$ D. $x = \frac{1}{2}$
-

10. Find the x – intercept of $f(x) = \frac{7-4x}{2x+14}$

- A. $(\frac{1}{2}, 0)$
 - B. $(-2, 0)$
 - C. $(-7, 0)$
 - D. $(\frac{7}{4}, 0)$
 - E. None of these
-

11. Subtract and simplify: $\frac{5}{2-3x} - \frac{4}{2+3x}$

- A. $\frac{1}{4-9x^2}$
 - B. $\frac{2}{4-9x^2}$
 - C. $\frac{2+27x}{4-9x^2}$
 - D. $\frac{2+3x}{9x^2-4}$
 - E. None of these.
-

12. The domain of $f(x) = \frac{2x}{x^2+4}$ is the set of real numbers.

- A. TRUE
- B. FALSE

13. Find the correct equation for the following:

The variable X varies inversely as the square of Y
and directly as the cube root of T.

A. $X = \frac{k y^2}{\sqrt[3]{T}}$

B. $X = \frac{k t^3}{y^2}$

C. $X = \frac{k \sqrt[3]{T}}{y^2}$

D. $X = \frac{k \sqrt[3]{T}}{\sqrt{y}}$

14. Find the horizontal asymptote for $y = \frac{2x-4}{6x-x^2}$.

A. $Y = 2$

B. $Y = 0$

C. $Y = 6$

D. $Y = -2$

E. None of these

15. Find the solution set for: $\frac{2-x}{x-5} \geq 0$

A. $[2, 5]$ B. $(2, 5]$ C. $(2, 5)$ D. $[2, 5)$

Multiple Choice Practice for Chapter Five

1. Given $m(t) = \sqrt[5]{t+3}$, find the inverse function, $m^{-1}(t)$.

A) $m^{-1}(t) = \frac{1}{\sqrt[5]{t+3}}$

B) $m^{-1}(t) = \sqrt[5]{t-3}$

C) $m^{-1}(t) = (t-3)^5$

D) $m^{-1}(t) = t^5 + 3$

E) $m^{-1}(t) = t^5 - 3$

2. If $f(x) = 5x$ and $g(x) = 2x^2$, then $f \circ g(3) = ??$

A) 180

B) 90

C) 450

D) 128

E) None of these

3. Given $f(x) = 3x^3 + 4$, find the inverse function, $f^{-1}(x)$.

A) $f^{-1}(x) = \sqrt[3]{\frac{x}{3}} - 4$

B) $f^{-1}(x) = \sqrt[3]{\frac{x-4}{3}}$

C) $f^{-1}(x) = \frac{1}{3x^3 + 4}$

D) $f^{-1}(x) = \frac{\sqrt[3]{x-4}}{3}$

E) None of these.

4. If $f^{-1}(x) = g(x)$, then $f \circ g(x) = ??$

- A. 1
 - B. 0
 - C. x
 - D. $g^{-1}(x)$
 - E. Undefined
-

5. Factor the following: $3x - 5x^{-2}$

- A. $x^{-2}(3x - 5)$
 - B. $x^{-2}(3x^{-3} - 5)$
 - C. $x^{-2}(3x^{-1} - 5)$
 - D. $x^{-2}(3x^3 - 5)$
 - E. None of these
-

6. If $f(x) = g \circ h(x)$ and $f(x) = 18x^2 - 12x + 5$ and $h(x) = 3x$, then $g(x) = ??$

- A. $2x^2 - 4x + 5$
 - B. $6x^2 - 4x + 5$
 - C. $6x^2 - 9x + 5$
 - D. $3x^2 - 4x + 5$
 - E. None of these
-

7. Which of the following is not in the domain of $y = \frac{2x}{\sqrt{9-x^2}}$?

- A. $x = 0$
- B. $x = -3$
- C. $x = 1$
- D. $x = \frac{5}{2}$

8. If $f(x) = \sqrt{x}$ and $g(x) = x^2 + 9$, then $g \circ f(x) = x + 9$.
What is the domain of $g \circ f(x)$?

- A. All real numbers
 - B. $[9, \text{infinity})$
 - C. $[0, \text{infinity})$
 - D. $(-\text{infinity}, 9]$
 - E. None of these
-

9. Find the solution set for $\sqrt{4x + 20} \leq 6$

- A. $(-\text{infinity}, 4]$
 - B. $[-4, 4]$
 - C. $[4, \text{infinity})$
 - D. $[-5, 4]$
 - E. None of these
-

10. For which function, $f(x)$, is $f \circ f^{-1}(x) = x$?

- A. $f(x) = \frac{x}{2}$
 - B. $f(x) = \frac{2x-1}{2}$
 - C. $f(x) = \frac{1}{x}$
 - D. $f(x) = \sqrt{x}$
 - E. None of these
-

11. If $f(x) = 4x^2$ and $g(x) = 3x$, then $f \circ g(2k) = ??$

- A. $36k^2$ B. $72k^2$ C. $144k^2$ D. $48k^2$

Multiple Choice Practice for Chapter Six

1.. Rewrite $a^5 = M$ in logarithmic form.

- A) $\log_5 a = M$
 - B) $\log_M 5 = a$
 - C) $\log_M a = 5$
 - D) $\log_5 M = a$
 - E) $\log_a M = 5$
-

2. Find the value of $\log_5 60$, rounded to four decimal places.

- A) 0.3931
 - B) 1.0792
 - C) 2.4849
 - D) 2.5440
 - E) None of these.
-

3. The function $N(t) = (0.5)^{t/14}$ models the percentage of phosphorus-32 that remains in a sample after t days. Estimate the percentage of phosphorus-32 that remains after 12 days. Round your answer to the nearest tenth.

- A) 7.3%
 - B) 13.8%
 - C) 55.2%
 - D) 57.3%
-

4. Find the balance if \$1000 is invested at an annual rate of 9% for 5 years, compounded continuously.

- A) \$1538.62 B) \$1568.31 C) \$5470.87 D) \$24,760.99
 - E) None of these.
-

5. Which of the following statements concerning $f(x) = ca^x$ is FALSE?

- A) The domain is all real numbers.
 - B) The range is all real numbers.
 - C) The graph approaches, but does not touch, the x -axis.
 - D) The y -intercept is $(0, c)$.
 - E) This function is one-to-one.
-

6. Write $5^m = t$ in logarithmic form.

- k. $\log_5 t = m$
 - l. $\log_5 m = t$
 - m. $\log_t 5 = m$
 - n. $\log_m t = 5$
 - o. None of these.
-

7. Which of the following statements is FALSE about $f(x) = 3 \cdot 2^x$?

- p. This function is always increasing.
 - q. The y -intercept is 3.
 - r. There is no x -intercept.
 - s. The domain is all real numbers.
 - t. The range is all real numbers.
-

8. Evaluate $\log_2 64 + \log_4 \frac{1}{4}$.

- u. 1
 - v. 5
 - w. 6
 - x. 7
 - y. None of these.
-

9. The principal in an IRA is \$10,000, with an interest rate of 5.7%, compounded continuously. Determine the value of the IRA after 15 years, to the nearest dollar.

- a. \$22,968
 - b. \$23,466
 - c. \$23,512
 - d. \$23,514
 - e. None of these.
-

10. Find the solution(s) of $\log(x+1) + \log(x-1) = \log 3$.

- J. Both 2 and -2
 - K. 2 only
 - L. -2 only
 - M. There is no solution.
-

11. Expand $\log_b a^6 t^3$.

- N. $6\log_b a - 3\log_b t$
 - O. $6\log_b a + 3\log_b t$
 - P. $2\log_b a + \log_b t$
 - Q. $\frac{2\log_b a}{\log_b t}$
 - R. None of these.
-

12. Find the exact solution of $3^x = 4^{x+1}$, using the common logarithm.

- A. $\frac{\log 4}{\log 0.75}$
- B. $\log \frac{16}{3}$
- C. $\frac{\log 0.75}{\log 4}$
- D. $\log 3$
- E. None of these.

13. Simplify: $\log_5 5 + \log_6 1$

- A) 0
 - B) 1
 - C) 2
 - D) 11
 - E) None of these.
-

14. Write $3\ln x - 2\ln y - \ln z$ as a single logarithm.

- A) $\ln \frac{x^3 z}{y^2}$
 - B) $\ln x^3 y^2 z$
 - C) $\ln \frac{x^3}{y^2 z}$
 - D) $\ln \frac{y^2}{x^3 z}$
-

15. Which of the following is not in the domain of $y = \frac{3x}{\ln(2x+5)}$?

- A. $x = 0$
 - B. $x = 2$
 - C. $x = -2$
 - D. $x = -1$
 - E. All of these are in the domain of y
-

16. Find the solution set for the equation:

$$\log x + \log (x - 9) = 1$$

- A. $x = 10$ and $x = - 1$
 - B. $x = 10$ and $x = 1$
 - C. $x = 10$
 - D. $x = 10$ and $x = - 10$
 - E. None of these
-

17. Which of the following is a property of logarithms?

- A. $\log (x + y) = \log x + \log y$
- B. $(\log x)^n = n \log x$
- C. $\log x - \log y = \frac{\log x}{\log y}$
- D. $\log (k x) = k \log x$
- E. None of these is a property for logarithms

Multiple Choice Practice for Chapter Eight

1. Find the x -coordinate of the system $\begin{cases} x + 2y = 5 \\ 2x - y = 0 \end{cases}$.

- z. 2
 - aa. 1
 - bb. 4
 - cc. -3
 - dd. None of these.
-

2. Use elimination to determine the y -coordinate of the system $\begin{cases} 5x - 3y = -1 \\ -5x + y = -3 \end{cases}$.

- ee. 1
 - ff. 2
 - gg. 3
 - hh. 4
 - ii. None of these.
-

3. The sum of two numbers is 10 and their product is 24. What is the value of the smaller number?

- jj. 3
 - kk. 4
 - ll. 5
 - mm. 6
 - nn. None of these.
-

4. Find the y -coordinate of the system $\begin{cases} x + y - z = -9 \\ 3x - 2y + 4z = 44 \\ -4x - y + 2z = 11 \end{cases}$.

- oo. 0
- pp. 2
- qq. 8
- rr. -3
- ss. None of these.

5. Bill has 60 coins worth \$8.50 in his piggybank. The number of dimes equals the number of nickels and quarters combined. How many quarters does he have?

- tt. 10
- uu. 20
- vv. 30
- ww. 40
- xx. None of these.

6. How many solutions exist for this system of equations?

$$\begin{cases} x^2 + y^2 = 26 \\ x + y = 5 \end{cases}$$

- yy. 0
- zz. 1
- aaa. 2
- bbb. 3
- ccc. More than 3.

Review for Final Exam

1. What is the domain of $f(x) = \frac{x-3}{x^2-4}$?

2. Simplify $\frac{x^2+7x+12}{x^3+4x^2-9x-36}$

3. Given the function $f(x) = x^2 - x + 2$, evaluate and simplify $\frac{f(x+h) - f(x)}{h}$.

4. If $f(x) = x^2 - 1$ and $g(x) = x + 3$, find $f(g(x))$ and $g(f(x))$.

5. Factor each of the following:

a. $3a^2b - 3ab - 9b$

b. $2d^3 + 3d^2 - 4d - 6$

c. $16y^4 - 1$

d. $c^3 - 125$

e. $6p^2 - p - 2$

6. Given $f(x) = 3x - 2$, sketch a graph of $f(x)$ and its inverse.

7. What is the inverse of each of the following functions?

a. $y = 3x - 2$

b. $y = \sqrt{x}$

c. $y = e^x$

8. Perform the indicated operation:

a. $\frac{x^2 - 1}{x + 2} \cdot \frac{x^2 + 5x + 6}{x^2 + 4x + 3}$

b. $\frac{3y^2 + 7y - 20}{y^2 - 2y + 1} \div \frac{y^2 + 5y + 4}{3y^2 - 2y - 5}$

c. $\frac{2x}{x-y} - \frac{2y}{x+y}$

d. $\frac{8}{x^2-16} - \frac{7}{x^2+7x+12}$

9. Given the function $y = 3x - 2$, prove (i.e., show the steps) the following: $(f \circ f^{-1})(x) = x$.

10. Write as logarithmic statements:

a. $3^2 = 9$

b. $5^{-2} = \frac{1}{25}$

c. $A^b = c$

11. Write as exponential statements:

a. $\log_{10} 1000 = 3$

b. $\log_{64} 8 = \frac{1}{2}$

12. Solve:

a. $\log_2 32$

b. $\log_{32} 2$

d. $\ln e$

e. $\ln e^a$

13. If $\log_b X = 0.4$ and $\log_b Y = 0.8$, find each of the following:

a. $\log_b X^2 Y$

b. $\log_b \sqrt{\frac{X}{Y}}$

14. Simplify (as one term): $\log_b R + 2\log_b S - \frac{1}{2}\log_b T$

15. Sketch the graph of each of the following:

a. $y = (x-3)^2 + 5$

b. $y = -(x-4)^2 - 3$

16. Sketch the graph of each of the following:

a. $y = |x|$

b. $y = |x + 2|$

c. $y = |x| + 2$

17. Solve for x:

a. $|x - 2| = 5$

b. $4x^2 - 9x + 2 = 0$

c. $-2x + 3 < 6$

d. $1 < 4x + 1 < 3$

e. $x^2 + x \leq 12$

f. $\frac{x^2 + x - 2}{x} \geq 0$

18. Simplify:

a. $(x^{-3}y^{-4})^{-5}$

b. $\frac{(2ab^{-4})^2}{(3a^2b)^{-3}}$

c. $(y^{2/3})^{6/7}$

d. $\sqrt[3]{128}$

e. $5\sqrt{32} - 4\sqrt{18}$

19. What are the x-intercepts of the quadratic function $y = 2x^2 - x - 3$?

20. Solve: $\sqrt{x+10} - x = 10$

21. Evaluate:

a. $-\sqrt{-49}$

b. $(3-7i)(2-i)$

c. $\frac{5-3i}{6+i}$

22. Solve the system $\begin{cases} y = -4x + 8 \\ x = 5y + 2 \end{cases}$.

23. Test for symmetry:

a. $xy = 9$

b. $x^2 + y^2 = 25$

c. $y = x^2$

24. Solve: $2^{2x+1} = 3^{x+4}$

25. When her child is born, a parent invests \$500 in a CD that pays 6% interest.
Compute the balance after 20 years if interest is compounded

d. annually

e. quarterly

f. daily

g. continuously

26. Determine the far left and far right behavior of the graph of the polynomial function

$$f(x) = -4x^3 - 2x^2 + 5x + 3.$$

27. Find all asymptotes of $f(x) = \frac{x-3}{x^2-16}$.

28. Solve the system $\begin{cases} 3x + 9y = 5 \\ 2x + 6y = 1 \end{cases}$.

29. Solve the system $\begin{cases} y = \frac{1}{x} \\ x + 5y = 6 \end{cases}$.

30. Suppose R varies directly with S and inversely with T. When $S = 5$ and $T = 100$, $R = 45$.
Find the value of R when $S = 13$ and $T = 63$.

31. Find the average rate of change of $f(x) = x^3 - 4x + 1$ as x goes from -1 to 2 .

32. Find all zeros of $P(x) = x^4 - x^3 - 5x^2 - x - 6$.

33. Tickets to a concert are available in three types: \$10 adult, \$6 teen and \$2 child. A total of 500 tickets are available. Twice as many adult as teen tickets are sold. When all tickets are sold, \$3400 is received. How many of each type of ticket were sold?

34. Jaleel has 40 coins worth \$5. the number of nickels and quarters together equals the number of dimes. How many of each type of coin does he have?

35. Find the solutions of $x^2 + 9 = 0$.

Answer Key for Preliminary MC Practice

- 1) D**
- 2) E**
- 3) D**
- 4) A**
- 5) C**
- 6) E**
- 7) A**
- 8) D**
- 9) C**
- 10) A**
- 11) B**
- 12) E**
- 13) D**
- 14) A**
- 15) C**
- 16) B**
- 17) C**
- 18) B**
- 19) A**
- 20) B**

Answer Key for Chapter One MC Practice

- 1) B**
- 2) A**
- 3) E**
- 4) D**
- 5) C**
- 6) B**
- 7) B**
- 8) A**
- 9) C**
- 10) B**
- 11) A**
- 12) D**
- 13) E**
- 14) C**
- 15) B**
- 16) B**
- 17) D**
- 18) C**
- 19) B**

Answer Key for Chapter Two MC Practice

- 1) D**
- 2) B**
- 3) D**
- 4) A**
- 5) A**
- 6) E**
- 7) A**
- 8) B**
- 9) C**
- 10) D**
- 11) A**
- 12) A**
- 13) A**
- 14) D**
- 15) B**
- 16) B**
- 17) D**

Answer Key for Chapter Three MC Practice

- 1) C**
- 2) C**
- 3) C**
- 4) B**
- 5) D**
- 6) B**
- 7) B**
- 8) D**
- 9) C**
- 10) A**
- 11) J**
- 12) L**
- 13) R**
- 14) C**
- 15) C**
- 16) B**
- 17) E**
- 18) A**
- 19) D**

Answer Key for Chapter Four MC Practice

- 1) D
- 2) C
- 3) A
- 4) U
- 5) B
- 6) I
- 7) C
- 8) C
- 9) C
- 10) D
- 11) C
- 12) A
- 13) C
- 14) B
- 15) D

Answer Key for Chapter Five MC Practice

- 1) E
- 2) B
- 3) B
- 4) C
- 5) D
- 6) A
- 7) B
- 8) C
- 9) D
- 10) C
- 11) C

Answer Key for Chapter Six MC Practice

- 1) E**
- 2) D**
- 3) C**
- 4) B**
- 5) B**
- 6) K**
- 7) T**
- 8) V**
- 9) D**
- 10) K**
- 11) O**
- 12) A**
- 13) E**
- 14) C**
- 15) C**
- 16) C**
- 17) E**

Answer Key for Chapter Eight MC Practice

- 1) AA**
- 2) FF**
- 3) KK**
- 4) RR**
- 5) UU**
- 6) AAA**

Final Review Key for Math 1503

- $D = \{x \mid x \neq \pm 2\}$
- $\frac{1}{x-3}$
- $2x+h-1$
- $f(g(x)) = x^2 + 6x + 8, g(f(x)) = x^2 + 2$
- $3b(a^2 - a - 3), (2d+3)(d^2 - 2), (4y^2 + 1)(2y+1)(2y-1), (c-5)(c^2 + 5c + 25), (2p+1)(3p-2)$
- (sketch not included)
- $y = \frac{x+2}{3}, y = x^2, y = \ln x$
- $x-1, \frac{(3y-5)^2}{(y-1)^2}, \frac{2(x^2 + y^2)}{x^2 - y^2}, \frac{x+52}{(x^2 - 16)(x+3)}$
- $f\left(\frac{x+2}{3}\right) = 3\left(\frac{x+2}{3}\right) - 2 = (x+2) - 2 = x$
- $\log_3 9 = 2, \log_5 \frac{1}{25} = -2, \log_A c = b$
- $10^3 = 1000, 64^{0.5} = 8$
- 5; $1/5$; 1; a
- 1.6, -0.2
- $\log_b \frac{RS^2}{\sqrt{T}}$
- a) Parabola opening up with vertex (3,5) and y-intercept = 14; (6,14) is an image point; no x-intercepts;
b) Parabola opening down with vertex (-4,-3) and y-intercept = -19; (-8,-19) is an image point.
- a. V-shape through (0, 0) and (± 1 , 1)
 - V-shape shifted 2 to the left
 - V-shape shifted 2 up
- 7, -3; $1/4, 2$; $x > -3/2$; $0 < x < 1/2$; [-4, 3]; [-2, 0) and [1, ∞)

18. $x^{15}y^{20}; \frac{108a^8}{b^5}; x^{4/7}; 4\sqrt[3]{2}; 8\sqrt{2}$

19. $-1, 3/2$

20. $-10, -9$

21. $-7i, -1-17i, \frac{27}{37} - \frac{23}{37}i$

22. $(2,0)$

23. origin, all three, y-axis

24. 374.7 cubic feet

25. \$1603.57, \$1645.33, \$1659.89, \$1660.06

26. Up to the left and down to the right

27. $x = \pm 4, y = 0$

28. Inconsistent

29. $(1,1)$ and $(5, 1/5)$

30. 186

31. -1

32. $i, -i, -2, 3$

33. 240 adult, 120 teen, and 140 child

34. 10 nickels, 20 dimes, 10 quarters

35. $\pm 3i$