

Math 1220-003, Summer 2018

Exam 1 (Practice)

Name: _____

UID: _____

1. (10 points) True/false:

(a) $\arcsin(\sin(\pi)) = \pi$

(b) $\sin(\arcsin(1/\sqrt{2})) = 1/\sqrt{2}$

(c) There's more than one solution to the differential equation $\frac{dy}{dx} + x^4 y = e^x$.

(d) You can use a u -substitution to evaluate $\int e^x \sin x \, dx$.

(e) You can use a trigonometric substitution to evaluate $\int \sqrt{10 - x^2} \, dx$

2. A tank of salt water starts with 20kg of salt dissolved in 100L of water. Salt water pours into the tank at a concentration of 2kg/L, at a rate of 3L/sec. At the same time, water is pouring out of the tank at a rate of 5L/sec. Answer the following:

(a) (2 points) Find a formula for the volume of water left in the tank after t seconds.

(b) (4 points) What is the rate of salt pouring into the tank at time t ?

(c) (4 points) What is the rate of salt pouring out of the tank at time t ?

(d) (10 points) How much salt is there in the tank after 30 seconds?

3. (10 points) A certain radioactive substance has a half-life of 10 years. How long will it take for 100 grams of this substance to decay to 1 gram?

4. Find each of the following derivatives:

(a) (5 points) $3 \ln(e^{5x} + 1)$

(b) (5 points) $\frac{(x+2)^5(x^2-3)^{-2}}{\sqrt{x}+1}$

(c) (5 points) 3^{x+1}

(d) (5 points) $x^{\sin x+1}$

5. Find the following integrals:

(a) (10 points) $\int x2^x dx$

(b) (10 points) $\int \sin^3 x \cos^2 x dx$

(c) (10 points) $\int \frac{1}{2x^2 + 4x + 3} dx$

(d) (10 points) $\int x \sqrt[3]{x+2} dx$

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3	10	
4	10	
5	10	
6	10	
7	10	
8	20	
9	20	
Total:	100	