True/False Review Problems for Exam 1
Math 2924

Determine whether each of the statements are **True or False**.

1. $\int_2^1 t^{-1}\,dt = \ln(1/2)$.

2. $\dfrac{d}{dx}\{\ln(f(x))\} = \dfrac{f'(x)}{f(x)}$.

3. $\dfrac{d}{dx}\{e^{f(x)}\} = e^{f'(x)}$.

4. A number M exists such that $\ln x \le M$ for all $x > 0$.

5. The derivative of $\ln(2x)$ with respect to x is $1/x$.

6. $\int \dfrac{x}{1+x^2}\,dx = \ln(\sqrt{1+x^2}) + C$.

7. Let f be a one-to-one function. If (a,b) is a point on the graph of $y = f(x)$ then (b,a) is a point on the graph of $y = f^{-1}(x)$.

8. $exp(-x) = -exp(x)$ for all x.

9. $\int_0^{\ln 5} e^{2x}\,dx = 12$.

10. $2^\pi = e^{2\ln(\pi)}$.

11. $2^\pi = e^{\pi \ln(2)}$.

12. $\log_{10}(e) = 1/\ln(10)$

13. $\int_0^{\pi/4} \tan(x)\,dx = -\ln 2$

14. The inverse function of $f(x) = e^{1+\ln(x^3-1)}$ is $g(x) = (1+x/e)^{1/3}$.

15. The domain of the function f in problem 14 is the interval $(1, \infty)$.

16. The range of the function f in problem 14 is the interval $(1, \infty)$.

17. The derivative of 2^x with respect to x is 2^x.

18. $\arctan(-1) = 3\pi/4$.

19. $\arctan(x) = \arcsin(x)/\arccos(x)$

20. $\cos(\sin^{-1}(x))$ is always greater or equal to 0.

21. If $f(x) = \arctan(\sqrt{x})$ then $f'(1) = 1/2$.

22. $\int_{-2}^2 \dfrac{1}{4+x^2}\,dx = \dfrac{\pi}{2}$

23. $\tan^{-1}(\tan x) = x$ for all real numbers x.

24. If $f(x) = \sin^{-1}(\cos x)$, then $f'(4) = -1$.

25. $\displaystyle \int \frac{1}{x\sqrt{x^2 - 1}}\, dx = \sec^{-1}(x) + C$

26. The function $f(x) = \sin(x),\ 0 \le x \le \pi$ is one-to-one.

27. If $a < b$ then $e^a < e^b$.

28. If $a > 0$ then $\ln(a) > 0$.

29. For any number x, e^x is positive.

30. For any number x, $\ln(x)$ is positive.

31. If $x > 0$ then $(\ln x)^8 = 8\ln(x)$.

32. If $x < 0$ then $\ln(x^8) = 8\ln(-x)$.

33. $\displaystyle \frac{d}{dx}\{\ln(10)\} = \frac{1}{10}$.

34. $\displaystyle \frac{d}{dx}\{10^x\} = x10^{x-1}$.

35. The function $f(x) = \ln(\ln(x))$ is one-to-one and its inverse function is $g(x) = e^{e^x}$.

36. $\log_5(x) = \ln(x)/\ln(5)$

37. The domain of the function $f(x) = (x+1)^x$ is the interval $(0, \infty)$.

38. The range of the function $f(x) = e^{x^2}$ is the interval $[1, \infty)$.

39. $\displaystyle \int_{-e}^{1} \frac{1}{x}\, dx = -1$.

40. If $a > 0$ and $b > 0$ then $\ln(ab) = \ln(a) + \ln(b)$.

41. If $a > 0$ and $b > 0$ then $\ln(a + b) = \ln(a)\ln(b)$.

42. $\displaystyle \int_{2}^{8} \frac{1}{x}\, dx = 2\ln 2$

43. $\displaystyle \int_{1}^{e^x} \frac{dt}{t} = x$

44. The area of the region bounded by $y = 0$, $y = \ln(x)$ and $x = 2$ equals $\ln(2)$.

45. If the region from problem 44 is rotated around the x-axis then the volume of the resulting solid of revolution equals $\displaystyle \int_{0}^{\ln(2)} 2\pi y(2 - e^y)\, dy$.

46. The function $f(x) = x^2 \ln(x)$ has a local minimum at $x = 1/\sqrt{e}$.

47. The function $g(x) = x^2 e^{-x}$ is a decreasing function.