Math 1010 - Quiz 11

University of Utah

Fall 2009

Name: Solutions

NOTE: There are three pages of questions, so be sure to answer the question on the back of the exam.

1. Find the inverse of the function: (4 points)

$$f(x) = 4x - 7.$$

Step 1 : $y = 4x - 7$

Step 2 : $x = 4y - 7$

Step 3 : $x + 7 = 4y$

$$\Rightarrow \frac{x+7}{4} = y.$$

Step 4 : $f^{-1}(x) = \frac{x+7}{4}$.

2. Calculate the following:

   (a) $\log_3(9)$; (2 points)

   $$\log_3(9) = \log_3(3^2) = 2\log_3(3) = 2.$$

(b) $\log_5\left(\frac{1}{25}\right)$; (2 points)

$$\log_5\left(\frac{1}{25}\right) = \log_5(1) - \log_5(25) = 0 - \log_5(5^2) = -2\log_5(5) = -2.$$

(c) $\log_8(32)$ (3 points)

$$\log_8(32) = \frac{\log_2(32)}{\log_2(8)} = \frac{\log_2(2^5)}{\log_2(2^3)} = \frac{5}{3}.$$

3. You invest $\$100$ in the bank, and your account generates 4% interest, compounded annually. How many years will it take for your investment to double? Give your answer just in terms of logarithms, you don't need a decimal value. (4 points)

$$\$200 = \$100(1.04)^t$$

$$\Rightarrow \frac{\$200}{\$100} = 1.04^t$$

$$\Rightarrow 2 = 1.04^t \Rightarrow \log_{10}(2) = t\log_{10}(1.04)$$

$$\Rightarrow t = \frac{\log_{10}(2)}{\log_{10}(1.04)}.$$

Note: We used 10 as our base here, but we could have used any positive number except 1 as our base and it would have been just fine. So, any other acceptable base would of course be worth full credit. Also, if you're curious, the decimal value is $t \approx 17.67$ years.

4. What suggestions would you have for improving this class?[1] (5 points extra credit)

   Answers will, of course, vary, and any reasonable answer will be given full credit. I suspect most of the comments will be about how my incredible good looks distract from the mathematics, but there's nothing I can do about that. :)

[1] Yes, I know this won't be anonymous, but I promise I have a thick skin and a broad back, and it takes a lot to make me cry. More important, I don't hold grudges, especially when it comes to calculating final grades. So, please, just be candid.