Math 205 Quiz 4
September 13, 2016

Name: ANSWERS

Instructions: No calculators! Answer all problems in the space provided! Do your rough work on scrap paper.

1. Find the equation of the line that passes through the point $(3, -5)$ and (i) has slope -4 $y = -4x + 7$

   or (ii) is perpendicular to $2x - 4y = 3$ $y = \frac{1}{2}x - \frac{13}{2}$

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

   (a) $f \circ g =$ $18x^2 - 15x + 7$ (b) $g \circ f =$ $6x^2 - 3x + 11$

3. For $f(x) = \sqrt{x}$, find and simplify the difference quotient: $\frac{1}{\sqrt{x+h} + \sqrt{x}}$ OR $\frac{1}{\sqrt{b} + \sqrt{a}}$

4. The difference quotient also provides a way to find the average rate of change of a function. That is, $f_{avg} = \frac{f(b) - f(a)}{b - a}$ gives the average value of a function on the interval $[a, b]$. For $f(x) = \frac{1}{x}$, find the average rate of change between $x = 1$ and $x = 2$:

   $f_{avg} =$ $-1/2$

5. Complete the following rules:

   (a) $a^x \cdot a^y =$ a^{x+y} (b) $a^{\frac{x}{y}} =$ $\sqrt[y]{a^x}$ or $\sqrt[y]{a}^x$ (c) $\log_a(x^n) =$ $n \log_a x$

   (d) $\log_a\left(\frac{x}{y}\right) =$ $\log_a x - \log_a y$ (e) $\log_a 1 =$ 0 (f) $\log_a 0 =$ undefined

   (g) $(a^x)^y =$ a^{xy} (h) $\log_a b = c$ means $a^c = b$

   (i) $x^{-a} =$ $\frac{1}{x^a}$ (j) $\log_a a^x =$ x

6. True or false: $\log_a(x + y) = \log_a x + \log_a y$ FALSE!

Bonus:

1. Solve the equation $e^{2x+7} = 10 \Rightarrow x =$ $\frac{\ln 10 - 7}{2}$

2. Simplify: $\ln \sqrt{\frac{3x^2 e^x}{\sqrt{x}}} =$ $\frac{\ln 3}{2} + \frac{3 \ln x}{4} + \frac{x}{2}$

3. $\lim_{h \to 0} \frac{\left(\frac{1}{x+h} - \frac{1}{x}\right)}{h} =$ $-\frac{1}{x^2}$