Math 1203 Quiz 5
February 12, 2019

Name: ANSWERS

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

1. Complete the following rules:

(a) $\log_a(x^n) =$ $n\log_a x$ (b) $\log_a a^x =$ x (c) $\log_a(xy) =$ $\log_a x + \log_a y$

(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) $\log_a b = c$ means $a^c = b$

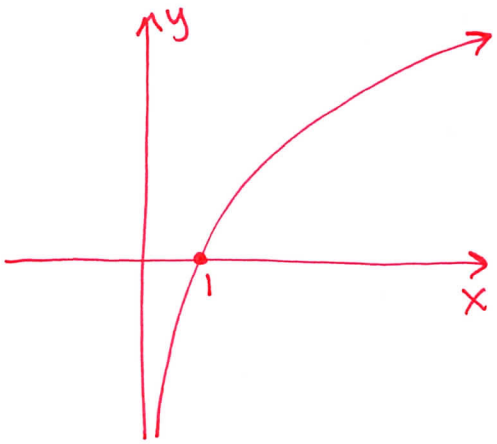
2. Simplify the expressions:

(a) $\ln\left(\frac{x^3 e^{4x}}{\sqrt{x+1}}\right) =$ $3\ln x + 4x - \frac{1}{2}\ln(x+1)$ (b) $e^{2\ln 4x} =$ $16x^2$

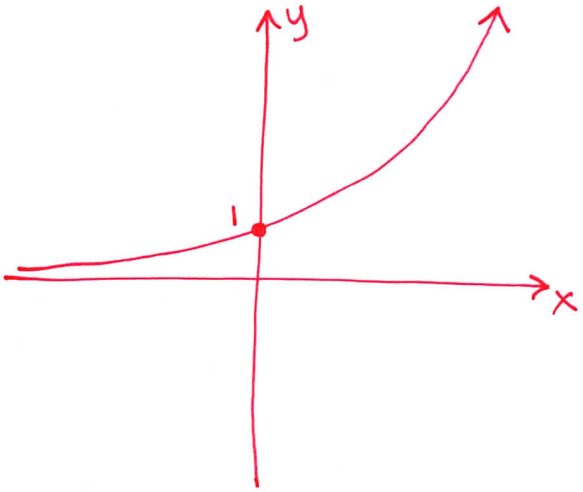
(c) $\ln x - \ln\sqrt{x} + 3\ln 4x =$ $\ln[\sqrt{x}(4x)^3]$ OR $\ln(64x^{7/2})$ (combine)

3. Graph the following functions below their definitions:

$y = \ln x$



$y = e^x$



4. Solve the following equations:

(a) $2e^{3x-1} = 5 :\Rightarrow x =$ $\frac{1+\ln(5/2)}{3}$ (b) $\ln\sqrt{x+1} = 3 :\Rightarrow x =$ $e^6 - 1$

5. For $f(x) = \frac{1}{x+2}$, find and simplify its average rate of change on [1,3]. $f_{avg} =$ $-\frac{1}{15}$

Bonus:

1. Compute the following limits:

(a) $\lim_{x\to\infty}\frac{2+3x^2-x^9}{e^x+2x^9} =$ 0 (b) $\lim_{x\to 1^+}\frac{x^2-1}{(x-1)^2} =$ ∞ (c) $\lim_{x\to-\infty}\frac{3+2x-3x^3}{2x^3-12x+1} =$ $-3/2$