Practice Test 3
BUSA130

This exam is graded out of 15 points. You **may not use a calculator** on Part I. You have 25 minutes to complete Part I. You must do all problems in Part I. You may use the remaining 65 minutes to complete Part II. You may use a calculator on Part II. You must do 4 of the 6 problems in Part II. Do not do all problems in Part II.

Part I

1) For the function given by the equation below, find the domain, y-intercept, x-intercept(s), vertical and horizontal asymptotes (if any exist), relative maxima/minima (if any exist), intervals on increase/decrease, points of inflection (if any exist), and intervals of concavity up/down. (4pts)

$$f(x) = \frac{4x^2}{x^2 - 4}$$

2) Solve the equations below. (1pt each)

- $4^{4x-2} = 16^{x^2}$

- $\log_x 100 = -\frac{1}{2}$

- $\log 10^x - \ln e = 0$

Part II

1) Find any relative extrema of the following functions. **Say whether they are relative minima or relative maxima!** Remember a relative extrema is a **point** and should be written as $(x, f(x))$. (1pts each)

- $f(x) = |x - 2| + 1$. (Hint: Look at the graph!)

- $g(x) = x^3 - 3x$.

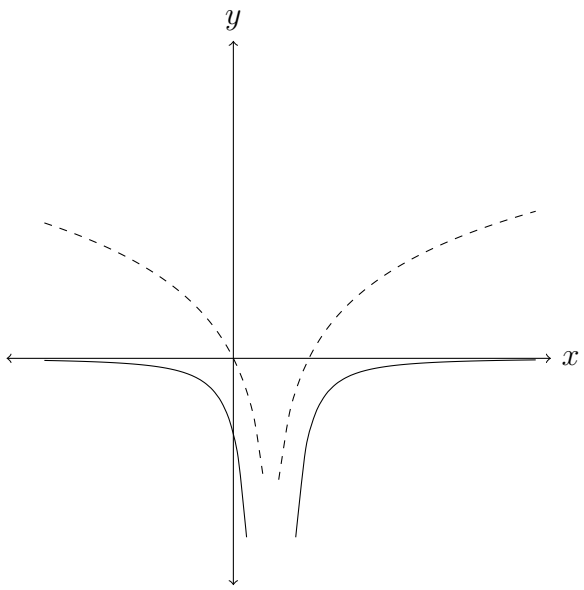
2) Find any points of inflection of the function $f(x) = -3x^4 - 4x^3$. (2pts)

3) A ferry fueled by diesel gets $\frac{20}{x}$ nautical miles per gallon of fuel if it is travelling at x nautical miles per hour (where x is between 6 and 15 nautical miles per hour). If the price of diesel is \$4 per gallon and the ferry's captain has a wage of \$20 per hour, at what speed should the ferry travel to minimize costs? What is this minimal cost rate? (2pts)

4) Use the laws of logarithms to expand and simplify the expression $\ln\left[\frac{(e^{2x}10)}{\sqrt{x}}\right]$. (2pts)

5) Find the absolute maximum of the function $f(x) = (3x+1)^2$ on the interval [-2,3] using the Extreme Value Theorem. (2pts)

6) In the two graphs below, which function is the **second** derivative of the other? Is the dotted function the second derivative of the solid function? Or is the solid function the second derivative of the dotted function?



Bonus: There will be a bonus question worth 0.5pts.