MATH FOR BUSINESS: CALCULUS, SPRING 2017 - MIDTERM I

Name: _____

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

Problem 1. If $f(x) = x^2 - 5x$ and $g(x) = 3x + 12$, write the formula of each of the following functions:

(1) $B(x) = f(x) - g(x)$.
(2) $\frac{f(x)}{g(x)}$.

Problem 2. Solve each of the following equations:

(1) $5^t = 20$
(2) $450e^{0.15t} = 1200$

Problem 3. Evaluate the following limit:

$$\lim_{x \to 0} \frac{\sqrt{x^2 + b^2} - b}{x}, \ b > 0.$$

Problem 4. Find the derivatives of the function using the definition of a derivative. State the domain of the function and its derivative:

(1) $f(x) = mx + b$
(2) $g(x) = x^2$

Problem 5. Find the first and second derivatives of the following functions:

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

Problem 6. Differentiate the following:

(1) $g(x) = \sqrt{x}e^x$

Problem 7 (Bonus)**.** Let $f(x)$ be defined as:

$$f(x) = \begin{cases} x^2 & x < 0 \\ -x^2 & x \geq 0 \end{cases}$$

(1) Determine whether or not $f'(0)$ exists by finding the left and right derivatives of $f(x)$.
(2) Graph f.
(3) Graph the left and right derivatives of $f(x)$.
(4) Looking at the graph of $f'(x)$, do you think that $f''(0)$ exists?

Date: February 24th, 2017.