

**MATH FOR BUSINESS: CALCULUS, SPRING 2017 - PROBLEM
SET 2**

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. use a calculator or a computer to determine where the function

$$g(x) = \frac{6x^2 - 4x + 5}{x^2 + 1}$$

is increasing and decreasing.

Problem 2. Simplify each of the following expressions

(1) $x^3 x^5$
(2) $\frac{b^2}{b^3}$

(3) $(u^4)^2$
(4) $(2xy^2)^3$

Problem 3. Show that the following statements are true:

(1) $4^{x+3} = (64)(4^x)$
(2) $12e^{0.2t} = 12(1.2214^t)$

Problem 4. Solve each of the following equations:

(1) $5^t = 20$
(2) $1.3^x = 7.65$

(3) $8e^{3x} = 31$
(4) $450e^{0.15t} = 1200$

Problem 5. Find the average rate of change of the functions given along with the corresponding interval.

(1) $f(x) = x^2 + 5x$ over $[1, 3]$
(2) $g(t) = 2t^3 - 4t$ over $[0, 2]$
(3) $C(x) = \frac{4x}{x+2}$ over $[4, 8]$

Problem 6. Same question as above, calculate the average rate of change of the functions with their corresponding intervals.

(1) $f(t) = 4.7\ln(t) + 1.8$ over $[16, 18]$
(2) $h(t) = 1.85(3^t)$ over $[2.9, 4.1]$
(3) $N(w) = 5e^{0.2w}$ over $[16, 22]$

Date: February 3rd, 2017.

Problem 7. The height of a baseball thrown into the air is given by the following function in terms of t seconds.

$$h(t) = 36t - 16t^2.$$

- (1) Find the average rate of change over the given intervals

- | | |
|-------------------------|--------------------------|
| (a) $0 \leq t \leq 1$ | (c) $0.9 \leq t \leq 1$ |
| (b) $0.5 \leq t \leq 1$ | (d) $0.99 \leq t \leq 1$ |

- (2) Estimate the rate of change of the ball after one second.

Problem 8. Evaluate the following limits:

(1)

$$\lim_{x \rightarrow 2} (x^3 + 2x^2 + 1)$$

(2)

$$\lim_{x \rightarrow 3} \frac{x^2 + 5}{x + 5}$$

(3)

$$\lim_{t \rightarrow 0} \left(\frac{1}{t} - \frac{1}{t^2 + t} \right)$$

(4)

$$\lim_{v \rightarrow 1} \frac{v^2 - 5}{v}$$

(5)

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

(6)

$$\lim_{x \rightarrow -4} \frac{x^2 + 5x + 4}{x^2 + 3x - 4}$$

Problem 9. Recall that

$$|x| = \begin{cases} x & x \geq 0 \\ -x & x \leq 0 \end{cases}$$

Let $f(x) = \frac{|x|}{x}$. Find

(1)

$$\lim_{x \rightarrow 0^+} f(x)$$

(2)

$$\lim_{x \rightarrow 0^-} f(x)$$

- (3) Does the limit of $f(x)$ exist? Explain.