

Instructions: This review is a very good indicator of what you will find on the exam. You will be allowed to use headphones so don't forget yours. You will NOT be able to share calculators or use your phone, iPod, etc. as a calculator. You got this, but study just in case.

1. Use the limit definition of the derivative, $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$, to find the derivative of

$$f(x) = 4x - 2x^2.$$

2. Determine what, if any, value to assign to $f(a)$ to make f continuous at $x = a$ if

$$f(x) = \frac{x^2 - 2x + 1}{x - 1}; a = 1.$$

3. For the function given below, find the location (x-value(s)) of all discontinuities. You must show work to receive any credit on this problem.

$$f(x) = \begin{cases} x - 7, & x \leq -5 \\ 2x - 2, & -5 < x < 4 \\ 3x + 1, & x \geq 4 \end{cases}$$

4. The following table shows total military and arms trade expenditure in 2000, 2005, and 2010 ($t = 0$ represents 2000):

Year, t	0	5	10
Military Expenditure $C(t)$, (\$ billion)	1,100	1,300	1,600

- Compute and interpret the average rate of change of $C(t)$ over the period 2005 – 2010.
 - Compute and interpret the average rate of change of $C(t)$ over the period 2000 – 2010.
- Find five limits. They will come from the first three sections of chapter 10.
 - Find three derivatives. They will come from chapter 11 section 1.

7. Find an equation of the tangent line to the graph of $f(x) = 5x^2 - 4x + 11$ at the point $(1, 12)$. Simplify to slope-intercept form, $y = mx + b$.

8. Your monthly profit (in dollars) from selling magazines is given by $P = 5x + \sqrt{x}$ where x is the number of magazines you sell in a month. If you are currently selling 50 magazines per month, find your profit and your marginal profit. Round to two decimal places. Interpret your answers.

9. The cost of fighting crime in the U.S. increased steadily in the period 1982 – 1999. Total spending on police and courts can be approximated, respectively, by

$$P(t) = 1.745t + 29.84 \text{ billion dollars} \quad (2 \leq t \leq 19)$$

$$C(t) = 1.097t + 10.65 \text{ billion dollars} \quad (2 \leq t \leq 19)$$

where t is time in years since 1980. Compute $\lim_{t \rightarrow \infty} \frac{P(t)}{C(t)}$ to two decimal places and interpret the results.