

*Math 211*

*Exam 1*

*Dr. Chandarana*

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*Name :*

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*Discussion Section Time*

**Note:** For full credit show all work and proper reasoning clearly. There will be very little or no credit for answers given without showing work. Incorrect reasoning may count against you. You are expected to give *exact* answers. No calculators are allowed on this exam. *After you finish writing the exam hand it to your TA along with the "cheat sheet".*

*There are seven (7) pages (including this page) on this exam and an extra sheet for scratch work. Do not miss any pages by mistake.*

*Good Luck!*

<i>problem</i>	<i>points</i>	<i>your score</i>
1	18	
2	14	
3	16	
4	18	
5	16	
6	18	
<i>total</i>	100	

1. (6 points each part) Evaluate the following limits, if they exist.

(a)  $\lim_{x \rightarrow -2} \frac{x^2 + x - 2}{x + 2}$

(b)  $\lim_{x \rightarrow 2} \frac{x^2 + x - 2}{x - 2}$

(c)  $\lim_{x \rightarrow 0} \frac{\sqrt{3+x} - \sqrt{3-x}}{3x}$

2. (14 points) You invest \$2300 at 7.5% annual rate of interest compounded continuously.

(a) How long will it take for your investment to grow to \$5350? *Give an exact answer.*

(b) At what annual rate of interest compounded continuously will your investment double in 5.5 years? *Give an exact answer.*

3. (16 points) (a) Use the definition of derivative:

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

to find the derivative of  $f(x) = \frac{1}{2x-1}$ .

(b) Find the slope of the tangent to the curve  $y = f(x) = \frac{1}{2x-1}$  at the point  $x = 3$ . *Show all work.*

4. (18 points) Suppose you can sell  $x$  radios per month at price  $p(x) = 50 - \frac{x}{50}$ , and the cost of producing  $x$  radios is  $C(x) = 10x + 500$  per month.

(a) Find the revenue function  $R(x)$ .

(b) Find the profit function  $P(x)$ .

(c) Find the marginal profit function  $P'(x)$ .

(d) Suppose you produce 1500 radios per month at present. How would you modify your production level  $x$  to increase profit? *Explain your reasoning clearly, and show all work.*

5. (16 points) (a) If  $f(x) = x^{\frac{1}{2}}$ , find  $f'(x)$ .
- (b) Use linear approximation to compute  $\frac{1}{\sqrt{102}}$ . You may leave your answer in fraction form.

6. (18 points)(a) If  $y = \ln(2x^3) - e^{-x} - 7^x + x^7 - \sqrt[3]{x}$ , find  $\frac{dy}{dx}$ .

(b) Find the point  $x$  where the graph of  $y = 3e^{2x} - x$  has a horizontal tangent.

*Scratch Work*