

Math 1131
Autumn 2012
Midterm 1
Form A

Name: _____

Name.nn: _____

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Instructions:

- You have **55 minutes** to complete this exam. It consists of 7 problems on 9 pages including this cover sheet and is worth a total of 100 points. The value of each question is listed below and with each question.
- You may not use any books or notes during this exam.
- Calculators are permitted EXCEPT those calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators and their upgrades are not permitted: TI-89, TI-92, and HP-49. In addition, neither PDAs, laptops nor cell phones are permitted.
- Make sure to read each question carefully.
- Please **write clearly** and make sure to **justify your answers**. Correct answers with no supporting work may receive no credit. Unless otherwise stated, solutions found by graphing will receive no credit.
- Please write your answers on the indicated lines.
- A random sample of graded exams will be xeroxed before being returned.

Problem	Point Value	Score
1	14	
2	12	
3	10	
4	12	
5	12	
6	28	
7	12	
Total	100	

(1). Find the following limits:

(a) (3 points) $\lim_{x \rightarrow 3} \frac{4x^2 - 7x - 15}{x^2 + 4x - 21} = \underline{\hspace{2cm}}$

(b) (3 points) $\lim_{x \rightarrow \infty} \frac{3 - 4x - 2x^3}{5x^3 - 8x - 1} = \underline{\hspace{2cm}}$

(Problem (1) cont.)

(c) (3 points) $\lim_{x \rightarrow -4^-} \frac{5x^2 + 19x - 4}{x^2 + 4x} = \underline{\hspace{2cm}}$

(d) (5 points) $\lim_{x \rightarrow 6} \frac{\sqrt{x-2} - 2}{x-6} = \underline{\hspace{2cm}}$

(2). Given

$$f(x) = \begin{cases} \frac{36}{x^2} & \text{if } x < 3 \\ 3x - 5 & \text{if } x \geq 3 \end{cases}$$

Find the following:

(a) (2 points) $\lim_{x \rightarrow 3^-} f(x) =$ _____

(b) (2 points) $\lim_{x \rightarrow 3^+} f(x) =$ _____

(c) (2 points) $\lim_{x \rightarrow 3} f(x) =$ _____

(d) (3 points) Is $f(x)$ continuous at $x = 3$? Explain your answer. _____

(e) (2 points) Find all points of discontinuity for $f(x)$ _____

(f) (1 point) $\lim_{x \rightarrow -\infty} f(x) =$ _____

(3). (10 points) Solve the given inequality using a sign graph:

$$\frac{x^2 - 2x - 15}{x^2 + 5x - 14} \geq 0$$

Answer (3): _____

(4). (12 points) Find an equation of the line that is tangent to the graph of the function

$$f(x) = x^4 - 17x^2 + 28$$

at $x = -2$.

Answer (4): $y =$ _____

(5). (12 points) Use definition of the derivative given below to find $f'(x)$ where $f(x) = \sqrt{7x}$ medskip

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

Answer (5): $f'(x) =$ _____

(6). Use differentiation rules to find the derivative, $\frac{dy}{dx}$, of each of the following: (You do not need to simplify your answers.)

(a) (7 points) $y = (x^3 + 6x^2 + 9)^{3/5}$

Answer (6a): $\frac{dy}{dx} = \underline{\hspace{10cm}}$

(b) (7 points) $y = (x^3 + 7x^2)(x^5 - x^2 + 5)$

Answer (6b): $\frac{dy}{dx} = \underline{\hspace{10cm}}$

(Problem (1) cont.)

(c) (7 points) $y = \frac{x^2 + 6}{\sqrt{x^3 + 5}}$

Answer (6c): $\frac{dy}{dx} = \underline{\hspace{10cm}}$

(d) (7 points) $y = \sqrt[3]{(7 - 3x^2)^2}$

Answer (6d): $\frac{dy}{dx} = \underline{\hspace{10cm}}$

(7). (12 points) If the total-cost function for a manufacturer is given by:

$$c = \frac{4q^2}{q^2 + 2} + 6000$$

find the marginal cost function.

Answer (7): Marginal cost function: _____