Math 1131
Autumn 2015
Midterm 1
Form A

Name: _____

Name.nn: _____

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Instructions:

- You have **55 minutes** to complete this exam. It consists of 8 questions on 8 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. Partial credit might not be awarded on some questions.

- 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. You **do not** need to show work for questions (1), (2) and (3).

- Unless otherwise specified, make sure your answers are in **exact form** (i.e. not decimal approximations).

- Please write your answers on the indicated lines.

- A random sample of graded exams will be xeroxed before being returned.

Question	Point Value	Score
1	17	
2	12	
3	10	
4	11	
5	11	
6	10	
7	15	
8	14	
Total	100	

(1). (17 points) Given the function

$$f(x) = \begin{cases} \dfrac{5(x)(x-3)(2x+5)}{7(x-3)(3x-10)} & \text{if } x \leq 4 \\[3mm] \dfrac{26(x-2)(2-8x)}{7(3x)(x-5)} & \text{if } x > 4 \end{cases}$$

Find the following:

(a) (2 points) $\lim\limits_{x \to 0} f(x) = $ _____

(b) (2 points) $\lim\limits_{x \to -\infty} f(x) = $ _____

(c) (2 points) $\lim\limits_{x \to 3^-} f(x) = $ _____

(d) (2 points) $\lim\limits_{x \to 4^-} f(x) = $ _____

(e) (2 points) $\lim\limits_{x \to 4^+} f(x) = $ _____
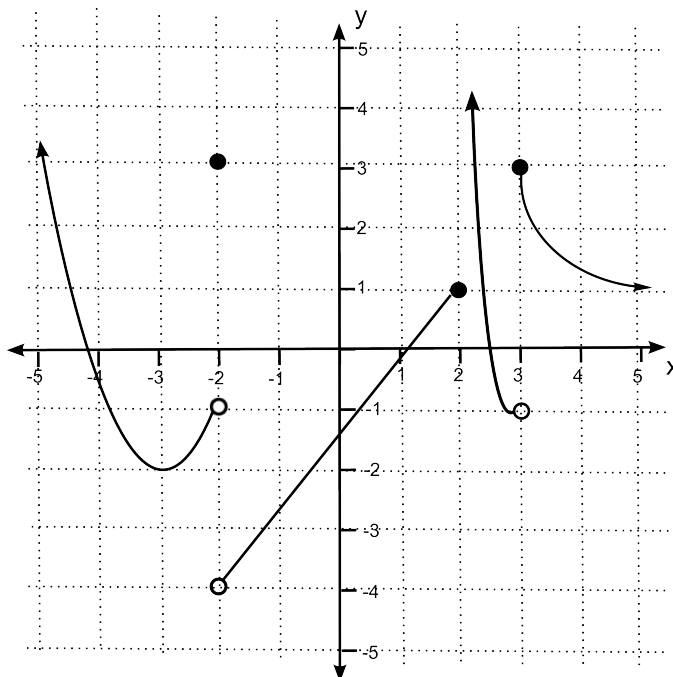
(f) (2 points) $\lim\limits_{x \to \infty} f(x) = $ _____

(g) (2 points) $\lim\limits_{x \to 5} f(x) = $ _____

(h) (3 points) Find all values of x for which $f(x)$ is not continuous. _____

(2). (12 points) Given the graph of $f(x)$ below:

(Note: This is the same graph as problem (3))

Find the following:

(**a**) (1 point) $\lim\limits_{x \to -2^-} f(x) =$ _____

(**b**) (1 point) $\lim\limits_{x \to -2^+} f(x) =$ _____

(**c**) (1 point) $\lim\limits_{x \to 2^-} f(x) =$ _____

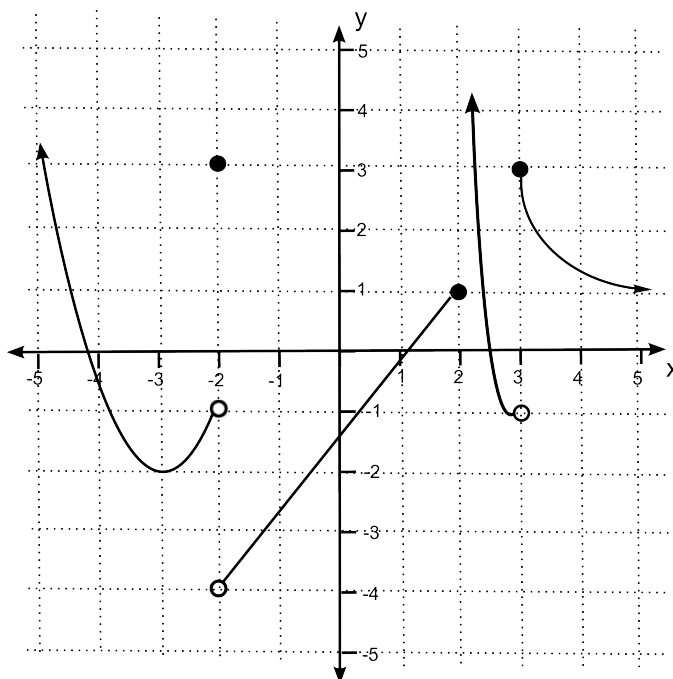(**d**) (1 point) $\lim\limits_{x \to 2^+} f(x) =$ _____

(**e**) (1 point) $\lim\limits_{x \to \infty} f(x) =$ _____

(**f**) (4 points) Is $f(x)$ continuous at $x = -3$? Explain your answer. _____

(**g**) (3 points) Find all values of x for which $f(x)$ is not continuous. _____

(3). (10 points) Given the graph of $f(x)$ below:

(Note: This is the same graph as problem (2))

Find a reasonable estimate for the following derivatives:

(**a**) (2 points) $f'(0) =$ _____

(**b**) (2 points) $f'(-3) =$ _____

(**c**) (2 points) $f'(4) =$ _____

(**d**) (2 points) $f'(3) =$ _____

(**e**) (2 points) $f'(-1) =$ _____

(4). (11 points) Let $f(x) = 5x^{2/3} - 7x^{1/2}$

    (a) (7 points) What is the slope of the line that is tangent to the graph of $f(x)$ at the point $(1, -2)$?

<div align="center">Answer (4a): Slope = _____</div>

    (b) (4 points) What is the equation of the line that is tangent to the graph of $f(x)$ at the point $(1, -2)$?

<div align="center">Answer (4b): Equation of line = _____</div>

(5). (11 points) If the **average** cost per unit for a manufacturer of a product is given by

$$\bar{c} = \frac{5}{4 + 3q}$$

    What is the marginal-cost function? (You do not need to simplify your answer.)

<div align="center">Answer (5): Marginal-cost function: _____</div>

(6). (10 points) Find the following:

(a) (5 points) A manufacturer of smart phones has found that when 152 smart phones are produced, the average cost is \$186 and the marginal cost is \$110. Based on that information, approximate the total cost of producing 153 smart phones. (*Please round your answer to the nearest cent.*)

Answer (6a): Total cost = _____

(b) (5 points) Solve using a sign chart or graph:

$$\frac{(x-2)(x+3)}{(x+5)} \leq 0$$

Please write your answer using interval notation.

Answer (6b): _____

(7). (15 points) Use the definition of the derivative to find $f'(x)$ where $f(x) = \sqrt{5 - x}$

$$\left(\text{Hint: Recall that the definition of the derivative is } f'(x) = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h}\right)$$

Answer (7): $f'(x) = $ _____

(8). (14 points) Use differentiation rules to find the derivative, $\dfrac{dy}{dx}$, of each of the following: (You do not need to simplify your answers.)

(**a**) (7 points) $y = \dfrac{(x^6 - 2)^5}{(x^4 + 8)^7}$

Answer (8a): $\dfrac{dy}{dx} = $ _____

(**b**) (7 points) $y = \left(\sqrt[5]{x^3 + 2}\right)(x^7 - 3)^6$

Answer (8b): $\dfrac{dy}{dx} = $ _____