

Calculus A

Name: _____

MATH 10350 EXAM I

Instructor: _____

September 25, 2007

Section: _____

Calculators are NOT allowed. Do not remove this answer page – you will return the whole exam. You will be allowed 1 hour and 15 minutes to do the test. You may leave earlier if you are finished.

Part I consists of 12 multiple choice questions worth 5 points each worth a total of 60 points. Record your answers by placing an \times through one letter for each problem on this answer sheet.

Part II consists of 4 partial credit problems worth a total of 40 points. Write your answer and show **all** your work on the page on which the question appears.

Sign the pledge. “On my honor, I have neither given nor received unauthorized aid on this Exam”:

1. a b c d e

7. a b c d e

2. a b c d e

8. a b c d e

3. a b c d e

9. a b c d e

4. a b c d e

10. a b c d e

5. a b c d e

11. a b c d e

6. a b c d e

12. a b c d e

For grading use:

1-12	
13	
14	
15	
16	
Total	

Part I: Multiple choice questions (5 points each)

1. Evaluate the limit

$$\lim_{x \rightarrow -2} \frac{x^2 + 3x + 2}{x^2 + 5x + 6}$$

- (a) -2 (b) -1 (c) 0 (d) 1 (e) 2

2. Evaluate the limit

$$\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 7x}$$

- (a) $5/7$ (b) $7/5$ (c) 5 (d) 7 (e) 1

3. Find the left hand limit

$$\lim_{x \rightarrow 1^-} \frac{|x - 1|}{x - 1}$$

- (a) -1 (b) 0 (c) 1 (d) $-1/2$ (e) does not exist

4. Evaluate the limit

$$\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 16} - 4}{x}$$

- (a) 16 (b) 4 (c) 1/8 (d) 1 (e) 0

5. Simplify the expression

$$f(x) = \lim_{\Delta x \rightarrow 0} \frac{\frac{1}{x + \Delta x} - \frac{1}{x}}{\Delta x}.$$

- (a) $-\frac{1}{x}$ (b) $\frac{1}{x}$ (c) $-\frac{1}{x^2}$ (d) $\frac{1}{x^2}$ (e) 0

6. Which of the statement concerning the function

$$f(x) = \begin{cases} x + 1 & \text{if } x < -1, \\ 1 & \text{if } x = -1, \\ x^2 - 1 & \text{if } x > -1 \end{cases}$$

is valid?

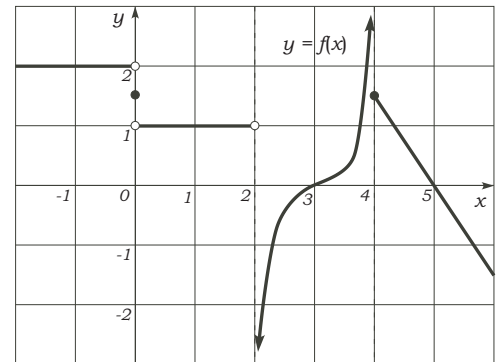
- (a) The function is differentiable at $x = -1$.
(b) The function is not differentiable, but is continuous at $x = -1$
(c) $\lim_{x \rightarrow -1} f(x)$ does not exist.
(d) The function has a removable discontinuity at $x = -1$.
(e) The function has a non-removable discontinuity at $x = -1$.

7. Let $f(x) = 2\pi - x^2 + x^2 \sin x$ then $f'(x) =$

- (a) $-2x + 2x \sin x - x^2 \cos x$ (b) $2 - 2x + 2x \sin x - x^2 \cos x$
 (c) $-2x + 2x \sin x + x^2 \cos x$ (d) $2 - 2x + 2x \sin x + x^2 \cos x$
 (e) $-2x - 2x \sin x + x^2 \cos x$

8. Let $f(x)$ be the function whose graph is shown below. Which of the following statements is **FALSE**?

- (a) $\lim_{x \rightarrow 4^+} f(x)$ is finite.
 (b) $\lim_{x \rightarrow 2^+} f(x) = -\infty$.
 (c) $\lim_{x \rightarrow 2^-} f(x)$ exists.
 (d) $\lim_{x \rightarrow 0} f(x)$ exists.
 (e) $\lim_{x \rightarrow 3} f(x) = f(3)$.



9. Find the value(s) of x for which the graph of $f(x) = \frac{x}{4} + \frac{1}{x}$ has a horizontal tangent line.

- (a) 2 only
 (b) -2 and 2
 (c) $1/2$ only
 (d) $-1/2$ and $1/2$
 (e) No such values.

10. Find the constant c so that the function

$$f(x) = \begin{cases} x^3 + 3x - 3c, & x > 1 \\ (x - 1)^2 + c, & x \leq 1. \end{cases}$$

is continuous.

- (a) 1 (b) 2 (c) 0 (d) -1 (e) -2

11. Which of the statements concerning the function

$$f(x) = |x - 1|.$$

Which of the statements concerning the function $f(x)$ is valid.

I. The function has a discontinuity at $x = 1$.

II. The left hand derivative does not exist at $x = 1$.

III. The function is not differentiable at $x = 1$.

- (a) *I* only (b) *II* only (c) *III* only (d) *I* and *II* only
(e) *II* and *III* only

12. Let $f(x)$ and $g(x)$ be two differentiable functions. If $f(1) = 2, g(1) = 2,$
 $f'(1) = 3, g'(1) = 4$ then

$$\left(\frac{f}{g}\right)'(1) =$$

- (a) $-1/2$ (b) $-2/9$ (c) $1/4$ (d) $1/9$ (e) -1

Part II: Partial credit questions. Show your work.

13. (10 points) Let $f(x) = x^2 + 7$.

(a) Find $f(x + \Delta x)$

(b) Simplify the expression $f(x + \Delta x) - f(x)$.

(c) Find the derivative $f'(x)$ by the limit definition.

14. Find the equation of the tangent(s) to the graph of the function $f(x) = 2x^3 - x + 1$ which is (are) parallel to the line $y - 5x = 8$.

15. Find the derivative of the functions:

$$(a) f(x) = \frac{1}{2 + \sin x},$$

$$f'(x) =$$

$$(b) f(x) = x^{2/3} - 11x + 7\pi\sqrt{2},$$

$$f'(x) =$$

$$(c) f(x) = x^2\sqrt{x},$$

$$f'(x) =$$

$$(d) f(x) = \frac{2x - 3}{4x + 5},$$

$$f'(x) =$$

