

**MATH 151, FALL 2008  
COMMON EXAM I - VERSION A**

LAST NAME, First name (print): \_\_\_\_\_

INSTRUCTOR: \_\_\_\_\_

SECTION NUMBER: \_\_\_\_\_

UIN: \_\_\_\_\_

SEAT NUMBER: \_\_\_\_\_

**DIRECTIONS:**

1. The use of a calculator, laptop or computer is prohibited.
2. In Part 1 (Problems 1-9), mark the correct choice on your ScanTron using a No. 2 pencil. *For your own records, also record your choices on your exam!*
3. In Part 2 (Problems 10-15), present your solutions in the space provided. *Show all your work* neatly and concisely and *clearly indicate your final answer*. You will be graded not merely on the final answer, but also on the quality and correctness of the work leading up to it.
4. Be sure to *write your name, section number and version letter of the exam on the ScanTron form*.

THE AGGIE CODE OF HONOR

**“An Aggie does not lie, cheat or steal, or tolerate those who do.”**

Signature: \_\_\_\_\_

**DO NOT WRITE BELOW!**

Question	Points Awarded	Points
1-9		45
10		8
11		10
12		10
13		8
14		10
15		9
		100

**PART I: Multiple Choice**

1. (5 pts) Which of the following vectors is parallel to the line  $2x + 4y = 11$ ?

- (a)  $\langle 2, 1 \rangle$
- (b)  $\langle 2, 4 \rangle$
- (c)  $\langle -2, 1 \rangle$
- (d)  $\langle -1, 2 \rangle$
- (e)  $\langle -2, 4 \rangle$

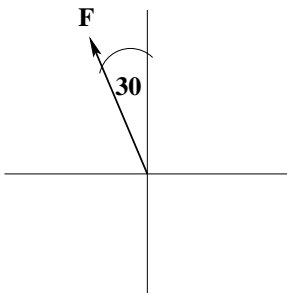
2. (5 pts)  $\lim_{x \rightarrow 4} \frac{x - 4}{2 - \sqrt{x}} =$

- (a) 4
- (b) -4
- (c)  $\frac{1}{4}$
- (d)  $-\frac{1}{4}$
- (e) The limit does not exist

3. (5 pts) Find the equation of the tangent line to the graph of  $f(x) = \frac{1-x}{1+x}$  at  $x = -2$ .

- (a)  $y = -2x + 6$
- (b)  $y = -2x - 1$
- (c)  $y = 2x - 7$
- (d)  $y = 2x + 1$
- (e)  $y = -2x - 7$

4. (5 pts) Find the work done by a force  $\mathbf{F}$  of 2 N acting in the direction  $N30^\circ W$  (as shown in the figure below) in moving an object 6 m due west.



- (a) 6 N-m
- (b)  $6\sqrt{3}$  N-m
- (c)  $6\sqrt{2}$  N-m
- (d) 1 N-m
- (e)  $\sqrt{3}$  N-m

5. (5 pts)  $\lim_{x \rightarrow 3^-} \frac{|x-3|}{x^2-9} =$

- (a) 1
- (b) 0
- (c)  $\frac{1}{6}$
- (d)  $\infty$
- (e)  $-\frac{1}{6}$

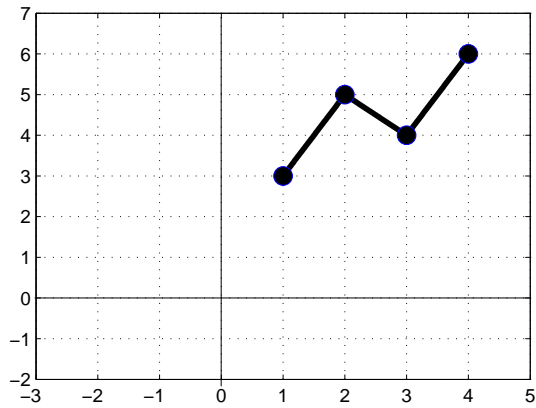
6. (5 pts)  $\lim_{x \rightarrow 5^-} \frac{x-7}{x(x-5)} =$

- (a) 1
- (b)  $\infty$
- (c)  $-\infty$
- (d)  $-\frac{2}{5}$
- (e) 0

7. (5 pts) Which of the following intervals contains a root to the equation  $x^3 + 2x^2 - 42 = 0$ ?

- (a)  $(-2, 0)$
- (b)  $(-1, 0)$
- (c)  $(0, 1)$
- (d)  $(1, 2)$
- (e)  $(2, 3)$

8. (5 pts) Refer to the graph of  $f(x)$  below to find the value of  $f'(1.5)$



- (a) 0
- (b) 1
- (c) 4
- (d) 2
- (e) Does not exist

9. (5 pts) Find the distance from the point  $(1, 5)$  to the line  $y = 2x + 1$

- (a)  $\frac{2}{\sqrt{3}}$
- (b)  $\frac{6}{\sqrt{5}}$
- (c)  $\frac{9}{\sqrt{5}}$
- (d)  $\frac{2}{\sqrt{5}}$
- (e)  $\frac{9}{\sqrt{3}}$

## PART II WORK OUT

**Directions:** Present your solutions in the space provided. *Show all your work* neatly and concisely and *Box your final answer*. You will be graded not merely on the final answer, but also on the quality and correctness of the work leading up to it.

10. (i) (5 pts) Find the value of  $a$  that makes  $f(x) = \begin{cases} x + 8a & \text{if } x < 3 \\ ax^2 & \text{if } x \geq 3 \end{cases}$  continuous.

- (ii) (3 pts) For the value of  $a$  found above, find  $\lim_{x \rightarrow 3} f(x)$ .

11. (10 pts) Find  $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 2x} - x)$ .

12. (10 pts) Given that  $f(4) = 3$ ,  $g(4) = -2$ ,  $f'(4) = -1$  and  $g'(4) = 4$ :

(i) If  $h(x) = \frac{f(x)}{g(x)}$ , find  $h'(4)$ .

(ii) If  $w(x) = f(x)g(x)$ , find  $w'(4)$ .

13. (8 pts)  $\mathbf{b} = \langle 1, 4 \rangle$  and  $\mathbf{a} = \langle 2, 3 \rangle$ .

(i) Find  $\text{proj}_{\mathbf{a}} \mathbf{b}$ , the vector projection of  $\mathbf{b}$  onto  $\mathbf{a}$

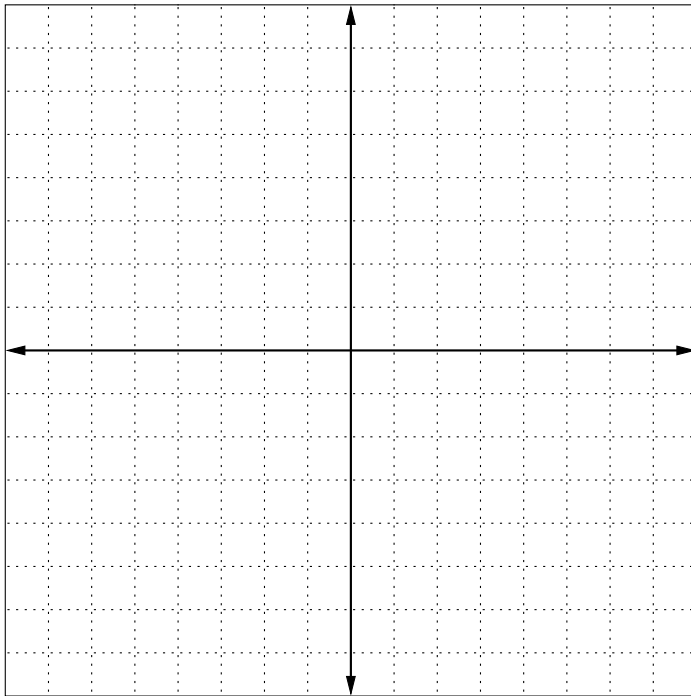
(ii) Find  $\text{comp}_{\mathbf{a}} \mathbf{b}$ , the scalar projection of  $\mathbf{b}$  onto  $\mathbf{a}$

14. (10 pts) Using the *definition of the derivative*, find  $f'(x)$  for  $f(x) = \frac{1}{x+1}$ .

**Exam continues on next page**

15. Consider  $f(x) = |4 - x^2|$ .

(i) (3 pts) Sketch the graph of  $f(x)$  on the grid provided below.



(ii) (2 pts) Find all value(s) of  $x$  where  $f(x)$  is not differentiable.

(iii) (4 pts) Find  $f'(x)$ .

**End of Exam**