

**MATH 151, FALL 2005  
COMMON EXAM II - VERSION B**

NAME (print): \_\_\_\_\_

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

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

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

**DIRECTIONS:**

1. The use of a calculator, laptop or computer is prohibited.
2. In Part 1 (Problems 1-13), mark the correct choice on your ScanTron form No. 815-E using a No. 2 pencil. *For your own records, also record your choices on your exam!* ScanTrons will be collected from all examinees after 90 minutes and will not be returned.
3. In Part 2 (Problems 14-18), 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
1-13		52
14		14
15		8
16		8
17		8
18		10
		100

**PART I**

1. (4 pts) If  $f(x) = e^{3x} + 2e^{2x} - 3e^x + 2x \cos(x)$ , then  $f'(0) =$

- (a) 10
- (b) 8
- (c) 7
- (d) 6
- (e) 4

2. (4 pts) Find  $\frac{d}{dx}(x^2 \sin(4x))$

- (a)  $8x \cos(4x)$
- (b)  $2x \sin(4x) - 4x^2 \cos(4x)$
- (c)  $2x \sin(4x) + 4x^2 \cos(4x)$
- (d)  $2x \cos(4x) - 4x^2 \sin(4x)$
- (e)  $2x \cos(4x) + 4x^2 \sin(4x)$

**Exam continues on next page**

3. (4 pts) Find  $\lim_{x \rightarrow 0} \frac{x(1 - 2 \cos(3x))}{\sin(3x)}$ .

(a)  $-\frac{2}{3}$

(b)  $-\frac{1}{3}$

(c) 0

(d)  $\frac{1}{3}$

(e)  $\frac{2}{3}$

4. (4 pts) If  $F(x) = f(g(x))$  where  $f(2) = 3$ ,  $g(2) = 5$ ,  $g'(2) = 4$ ,  $f'(2) = -2$ ,  $g'(3) = 7$  and  $f'(5) = 11$ , then  $F'(2) =$

(a) -14

(b) -8

(c) 2

(d) 44

(e) 72

Exam continues on next page

5. (4 pts) Find  $\frac{d}{dt}(xy^3)$  when  $x = 3$  and  $y = 2$ , given that  $dx/dt = 2$  and  $dy/dt = -4$ .

- (a) 44
- (b) 24
- (c) 0
- (d) -96
- (e) -128

6. (4 pts) If  $f(x) = \frac{3x+2}{2x+7}$ , then the inverse function of  $f(x)$  is

- (a)  $\frac{2x+7}{3x+2}$
- (b)  $\frac{7x+2}{3-2x}$
- (c)  $\frac{7x-2}{3-2x}$
- (d)  $\frac{7x-2}{3+2x}$
- (e)  $\frac{2x+7}{3+2x}$

Exam continues on next page

7. (4 pts) If  $h(t) = (t^3 - t^2 - 2t + 1)^3$ , then  $h'(2) =$

- (a) 108
- (b) 18
- (c) 9
- (d) 6
- (e) 3

8. (4 pts) Find  $\lim_{x \rightarrow -\infty} e^{x-1}$ .

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

Exam continues on next page

9. (4 pts) If  $\log_3 x + \log_3(x^3) = 8$ , then  $x =$

- (a) 27
- (b) 18
- (c) 12
- (d) 10
- (e) 9

10. (4 pts) If  $f(x) = x^3 + x + 5$  and  $g(x)$  denotes the inverse function of  $f(x)$ , then  $g'(7) =$

- (a) 1
- (b)  $\frac{1}{2}$
- (c)  $\frac{1}{4}$
- (d)  $\frac{2}{5}$
- (e)  $\frac{3}{5}$

Exam continues on next page

For problems 11-13, let the time  $t$  position of a particle be given by the vector function  $\mathbf{r}(t) = \langle t^3 - 4t^2 + 2, 2t^2 - 3t \rangle$ .

11. (4 pts) Find the position vector of the particle at time  $t = 3$ .

- (a)  $\langle 3, 9 \rangle$
- (b)  $\langle -7, 9 \rangle$
- (c)  $\langle 3, -3 \rangle$
- (d)  $\langle 9, 7 \rangle$
- (e)  $\langle 6, 5 \rangle$

12. (4 pts) Find the speed of the particle at time  $t = 3$ .

- (a)  $\langle 3, 9 \rangle$
- (b)  $\langle -7, 9 \rangle$
- (c)  $\langle -6, 3 \rangle$
- (d) 90
- (e)  $\sqrt{90}$

13. (4 pts) Find the acceleration of the particle at time  $t = 3$ .

- (a)  $\langle 1, 1 \rangle$
- (b)  $\langle -4, 8 \rangle$
- (c)  $\langle 4, 10 \rangle$
- (d)  $\langle 8, 4 \rangle$
- (e)  $\langle 10, 4 \rangle$

Exam continues on next page

**PART II**

14. Find  $f'(x)$  for the following functions. Don't simplify!

(a) (7 pts)  $f(x) = \frac{\tan(2x)}{\sin(3x) + \cos(4x)}$

(b) (7 pts)  $f(x) = \sqrt{1 + e^{(x^2+3x)}}$

**Exam continues on next page**

15. (8 pts) Find the equation of the tangent line to the curve  $2(x^2 + y^2)^2 = 25xy$  at the point  $(2, 1)$ .

**Exam continues on next page**

16. (8 pts) Starting with  $x_1 = 1$ , use Newton's method to find the approximation  $x_2$  to the solution of the equation  $x^7 - x - 2 = 0$ .

**Exam continues on next page**

17. (8 pts) Find the quadratic approximation of  $\sqrt[3]{x}$  for  $x$  near 27.

**Exam continues on next page**

18. (10 pts) A rocket that is launched vertically is tracked by a radar station located on the ground 3 mi from the launch site. What is the vertical speed of the rocket at the instant that its distance from the radar station is 5 mi and this distance is increasing at the rate of 5000 mi/hr.

**End of exam**