MATH 151, FALL 2005
COMMON EXAM II - VERSION A

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 $f(x) = e^{4x} - 5e^{3x} + 3e^{x} + \sin(x)$, then $f'(0) =$

   (a) 1
   (b) 0
   (c) -6
   (d) -7
   (e) -8

2. (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) 72
   (b) 44
   (c) 2
   (d) -8
   (e) -14

Exam continues on next page

3. (4 pts) Find $\lim_{x \to 0} \dfrac{3x(1+\cos(x))}{\sin(4x)}$.

(a) $\dfrac{3}{2}$

(b) $\dfrac{3}{4}$

(c) 0

(d) $-\dfrac{3}{4}$

(e) $-\dfrac{3}{2}$

4. (4 pts) Find $\dfrac{d}{dx}(x\cos(2x))$

(a) $\sin(2x) - 2x\cos(2x)$

(b) $\sin(2x) + 2x\cos(2x)$

(c) $\cos(2x) - 2x\sin(2x)$

(d) $\cos(2x) + 2x\sin(2x)$

(e) $-2x\sin(2x)$

Exam continues on next page

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

(a) 28

(b) 16

(c) -4

(d) -8

(e) -12

6. (4 pts) If $f(x) = \dfrac{2x+1}{x+5}$, then the inverse function of $f(x)$ is

(a) $\dfrac{x+5}{2x+1}$

(b) $\dfrac{1+5x}{x+2}$

(c) $\dfrac{1+5x}{x-2}$

(d) $\dfrac{1-5x}{x-2}$

(e) $\dfrac{2x+1}{x+5}$

Exam continues on next page

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

(a) 216
(b) 108
(c) 72
(d) 12
(e) -6

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

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

Exam continues on next page

9. (4 pts) If $\log_4 x + \log_4(x^2) = 6$, then $x =$

(a) 16
(b) 8
(c) 4
(d) 2
(e) 0

10. (4 pts) If $f(x) = x^5 + 2x + 1$ and $g(x)$ denotes the inverse function of $f(x)$, then $g'(4) =$

(a) 4
(b) 1
(c) $\frac{1}{7}$
(d) $\frac{1}{8}$
(e) $\frac{1}{12}$

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 $t = 2$.

    (a) $\langle -6\,,\, 2 \rangle$
    (b) $\langle -4\,,\, 2 \rangle$
    (c) $\langle -2\,,\, 4 \rangle$
    (d) $\langle 0, 0 \rangle$
    (e) $\langle 2, 4 \rangle$

12. (4 pts) Find the speed of the particle at time $t = 2$.

    (a) $\langle -2\,,\, 6 \rangle$
    (b) $\langle -4\,,\, 5 \rangle$
    (c) $\langle 0\,,\, 8 \rangle$
    (d) 41
    (e) $\sqrt{41}$

13. (4 pts) Find the acceleration of the particle at time $t = 2$.

    (a) $\langle 1\,,\, 2 \rangle$
    (b) $\langle 4\,,\, 4 \rangle$
    (c) $\langle 4\,,\, 2 \rangle$
    (d) $\langle -4\,,\, 4 \rangle$
    (e) $\langle 8\,,\, 6 \rangle$

Exam continues on next page

PART II

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

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

(b) (7 pts) $f(x) = e^{\sqrt{x^2+3x+4}}$

Exam continues on next page

15. (8 pts) Find the equation of the tangent line to the curve $y^5 + 3x^2y^3 + x^3 + 5 = 0$ 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 $x^5 + x^3 + 1 = 0$.

Exam continues on next page

17. (8 pts) Find the quadratic approximation of $\sqrt[4]{x}$ for x near 16.

Exam continues on next page

18. (10 pts) A balloon is rising at a constant speed of 5 ft/sec. A boy is cycling along a straight road at a speed of 15 ft/sec. When he passes under the balloon it is 45 ft above him. How fast is the distance between the boy and the balloon increasing 3 seconds later?

End of exam