MA 161 **EXAM 3** **November 10, 1998**

Name: _____

I.D.#: _____

Recitation Instructor: _____ **Time of Recitation**_____

Lecturer: _____ **Section#:** _____

Instructions:

1. Fill in your name, student ID number and division and section number on the mark-sense sheet. Also fill out the information requested above.
2. This booklet consists of 6 pages. There are 14 questions, each worth 7 points.
3. Mark your answers on the mark-sense sheet. Please show your work in this booklet.
4. No books, notes or calculators may be used.
5. When you are finished with the exam hand this booklet and the mark-sense sheet, in person, to your instructor.

1. Let $f'(x) = (x-1)(x-2)^2(x-3)e^{x^4 \cos x}$. Consider the following statements.
   I. f has a relative maximum at $x = 1$.
   II. f has a relative minimum at $x = 2$. Then

   A. I and II are both true.

   B. I is true, II is false.

   C. I is false, II is true.

   D. I and II are both false.

   E. There is insufficient information to decide whether these statements are true or false.

2. Let $f'(x) = (x-3)x^2$. Then the graph of $y = f(x)$ is concave up when

   A. $x > \sqrt{2}$ and when $x < -\sqrt{2}$

   B. $x > 2$ and when $x < 0$

   C. $-\sqrt{2} < x < \sqrt{2}$

   D. $0 < x < 2$

   E. The graph is never concave up.

3. Find the point on the graph of $y = \sqrt{x}$ that is closest to the point $(4, 0)$. The distance from this point to $(4, 0)$ is

   A. $\frac{\sqrt{18}}{2}$

   B. $\frac{\sqrt{17}}{2}$

   C. 2

   D. $\frac{\sqrt{15}}{2}$

   E. $\frac{\sqrt{14}}{2}$

4. A shed is to have a square base, a flat, horizontal roof, and a volume of 800 cubic feet. The floor costs \$6 per square foot, the roof \$2 per square foot and the walls \$5 per square foot. The cost of the cheapest such shed will be

   A. \$2400

   B. \$2000

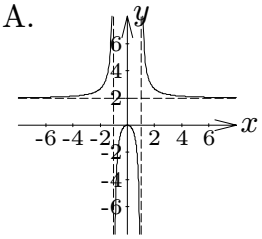
   C. \$1600

   D. \$1200

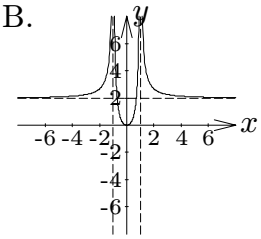
   E. \$800

5. The graph of the function $\dfrac{2x^2}{x^2-1}$ looks most like

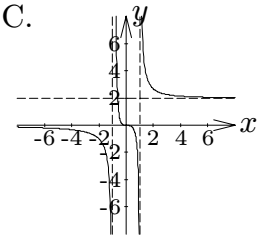
A.



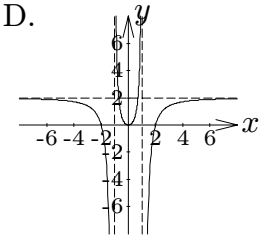
B.



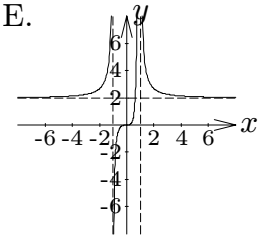
C.



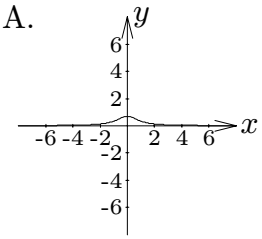
D.

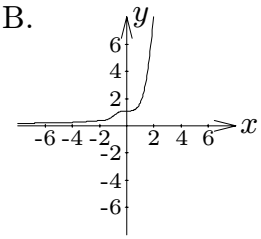


E.



6. The graph of $\ln(e^{x^3}+1)$ looks most like

A.


B.


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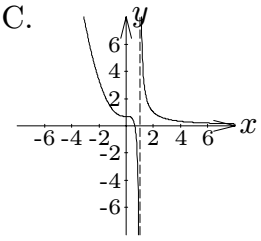

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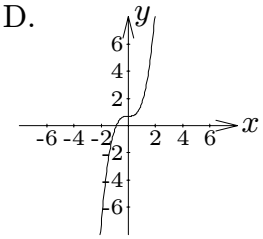

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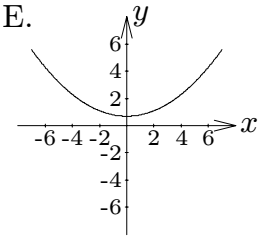

7. $\lim_{x\to\infty} \sqrt{4x^2-x} - 2x =$

A. -1

B. $\dfrac{-1}{4}$

C. 0

D. 2

E. The limit does not exist

8. Let $F(x) = \displaystyle\int_0^x (t^2 + \sin^2 t)dt$. Consider the following statements:

I. $F(x)$ is everywhere increasing

II. $F(0) = 0$

III. $F(-1) = F(1)$

Then

A. I, II, III are true

B. I and II are true; III is false

C. I is true; II and III are false

D. II is true; I and III are false

E. III is true, I and II are false

9. What value of a makes the following equation true for every continuous function f?

$$\int_1^4 f(t)dt - \int_a^4 f(t)dt = \int_1^{4-a} f(t)dt.$$

A. 1

B. 2

C. 3

D. 4

E. No value of a

10. $\dfrac{d}{dx}\displaystyle\int_{x^2}^{x^3} \sin(e^t)dt =$

A. $\sin(e^{x^3}) - \sin(e^{x^2})$

B. $\cos(e^{x^3}) - \cos(e^{x^2})$

C. $(3x^2 - 2x)\sin(e^x)$

D. $3x^2\sin(e^{x^3}) - 2x\sin(e^{x^2})$

E. $3x^2e^{x^3}\cos(e^{x^3}) - 2xe^{x^2}\cos(e^{x^2})$

11. $\displaystyle\int_3^8 \frac{|x-5|}{3}dx =$

A. $\dfrac{5}{6}$

B. 2

C. $\dfrac{13}{6}$

D. 4

E. 6

12. $\displaystyle\int_1^{e^2} \frac{\ln\sqrt{x}}{x}dx =$

A. -2

B. -1

C. 0

D. 1

E. 2

13. The area between the curves $y = x^3$ and $y = \dfrac{x^4}{2}$ is

A. $\displaystyle\int_0^1 \left(x^3 - \frac{x^4}{2}\right) dx$

B. $\displaystyle\int_0^1 \left(\frac{x^4}{2} - x^3\right) dx$

C. $\displaystyle\int_0^2 \left(x^3 - \frac{x^4}{2}\right) dx$

D. $\displaystyle\int_0^2 \left(\frac{x^4}{2} - x^3\right) dx$

E. None of the above.

14. $\displaystyle\int_{\pi/2}^{\pi/6} \frac{\cos t}{\sin^3 t}dt =$

A. $\dfrac{15}{4}$

B. $\dfrac{3}{2}$

C. 1

D. -1

E. $\dfrac{-3}{2}$