MA 123 — Elementary Calculus FALL 2008
THIRD MIDTERM 11/19/2008

Name: _____ **Sec.:** _____

Do not remove this answer page — you will return the whole exam. You will be allowed two hours to complete this test. No books or notes may be used. You may use a graphing calculator during the exam, but NO calculator with a Computer Algebra System (CAS) or a QWERTY keyboard is permitted. Absolutely no cell phone use during the exam is allowed.

The exam consists of 15 multiple choice questions. Record your answers on this page by filling in the box corresponding to the correct answer. For example, if (b) is correct, you must write

[a] [**b**] [c] [d] [e]

Do not circle answers on this page, but please do circle the letter of each correct response in the body of the exam. It is your responsibility to make it CLEAR which response has been chosen. You will not get credit unless the correct answer has been marked on both this page and in the body of the exam.

GOOD LUCK!

1. [a] [b] [c] [d] [e]

2. [a] [b] [c] [d] [e]

3. [a] [b] [c] [d] [e]

4. [a] [b] [c] [d] [e]

5. [a] [b] [c] [d] [e]

6. [a] [b] [c] [d] [e]

7. [a] [b] [c] [d] [e]

8. [a] [b] [c] [d] [e]

9. [a] [b] [c] [d] [e]

10. [a] [b] [c] [d] [e]

11. [a] [b] [c] [d] [e]

12. [a] [b] [c] [d] [e]

13. [a] [b] [c] [d] [e]

14. [a] [b] [c] [d] [e]

15. [a] [b] [c] [d] [e]

For grading use:

number of correct problems	**(out of 15)**
Total	**(out of 100 pts)**

Please make sure to list the correct section number on the front page of your exam.
In case you forgot your section number, consult the following table:

Section #	**Instructor**	**Lectures**
001	A. Corso	MWF 8:00am-8:50am, CP 153
002	J. Robbins	MWF 12:00pm-12:50pm, CP 153
003	T. Chapman	TR 8:00am-9:15am, BS 116
004	M. Anton	MWF 12:00pm-12:50pm, BS 116
005	D. Leep	MWF 3:00pm-3:50pm, CP 153
401	P. Cooley	TR 6:00pm-7:15pm, CB 347
402	P. Cooley	TR 7:30pm-8:45pm, CB 347

Multiple Choice Questions

Show all your work on the page where the question appears.
Clearly mark your answer both on the cover page on this exam
and in the corresponding questions that follow.

1. Two trains leave a station at the same time. One travels north on a track at 120 mph. The second travels east on a track at 50 miles per hour. How fast are they traveling away from one another in miles per hour when the northbound train is 120 miles from the station?

Possibilities:

(a) 120

(b) 125

(c) 128.4

(d) 130

(e) 132.6

---

2. An expanding rectangle has its length always equal to twice its width. The area is increasing at a rate of 64 square feet per minute. At what rate is the width increasing when the width is 2 feet?

Possibilities:

(a) 10

(b) 8

(c) 6

(d) 5

(e) 4

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3. Find the point (x_0, y_0) in the first quadrant that lies on the hyperbola $y^2 - x^2 = 5$ and is closest to the point $A(6, 0)$. Then (x_0, y_0) is

Possibilities:

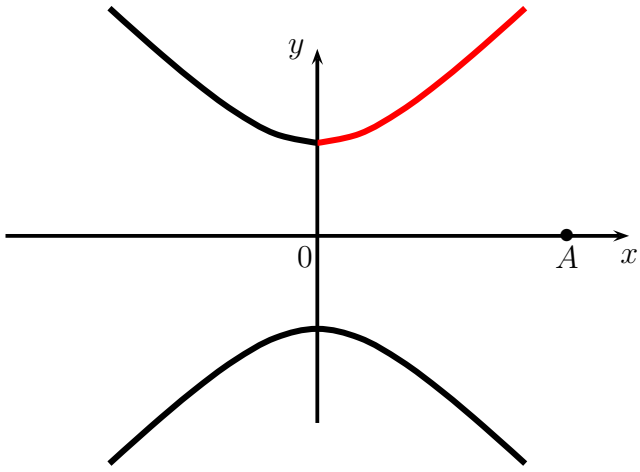
(a) $(1, \sqrt{6})$

(b) $(2, 3)$

(c) $(2.5, \sqrt{11.25})$

(d) $(3, \sqrt{14})$

(e) $(4, \sqrt{21})$



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4. Suppose that the sum of x and y is 9, x and y both positive. What is the value of x that gives the largest possible value of x^2y?

Possibilities:

(a) 6
(b) $\sqrt{6}$
(c) 8
(d) $\sqrt{8}$
(e) 4

---

5. Evaluate the sum $\displaystyle\sum_{k=2}^{6}(k^2+k)$.

Possibilities:

(a) 100
(b) 102
(c) 106
(d) 108
(e) 110

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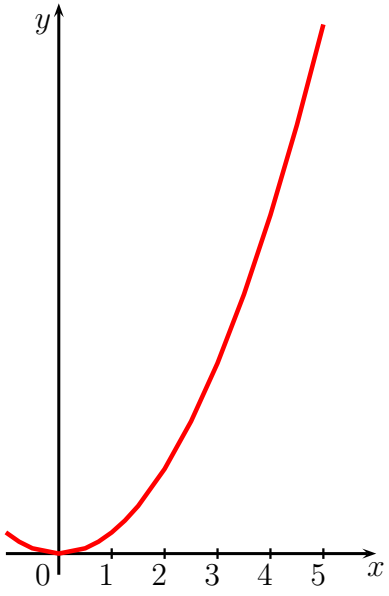
6. Estimate the area under the graph of $y = 3x^2$ for x between 1 and 5. Use a partition that consists of 4 equal subintervals of $[1, 5]$ and use the right endpoint of each subinterval as a sample point.



Possibilities:

(a) 162
(b) 164
(c) 166
(d) 168
(e) 170

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7. Suppose that the integral $\int_1^6 f(x)\,dx$ is estimated by the sum $\sum_{k=1}^{N} f(a+k\Delta x)\cdot\Delta x$. The terms in the sum equal areas of rectangles obtained by using right endpoints of the subintervals of length Δx as sample points. If $N = 50$, then what is Δx?

Possibilities:

(a) $.05$
(b) $.1$
(c) $.5$
(d) 1
(e) Cannot be determined

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8. Suppose that the integral $\int_2^{52} f(x)\,dx$ is estimated by the sum $\sum_{k=1}^{N} f(a+k\Delta x)\cdot\Delta x$. The terms in the sum equal areas of rectangles obtained by using right endpoints of the subintervals of length Δx as sample points. If $f(x) = \dfrac{1}{x}$ and $N = 50$, then find the area of the second rectangle.

Possibilities:

(a) $1/16$
(b) $1/9$
(c) $1/8$
(d) $1/4$
(e) $1/2$

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9. Suppose that the integral $\int_4^{10} \sqrt{x}\,dx$ is estimated by the sum $\sum_{k=1}^{N} \sqrt{(a+k\Delta x)}\cdot\Delta x$, where $\Delta x = .2$ and $N = 30$. The terms in the sum equal areas of rectangles obtained by using right endpoints of the subintervals of length Δx as sample points. What is a?

Possibilities:

(a) 2
(b) 3
(c) 4
(d) 5
(e) 6

---

10. Suppose that the derivative of $f(x)$ is given by $f'(x) = x^2 - 5x + 6$. Then the graph of $f(x)$ is concave upward on the following interval(s).

Possibilities:

(a) $(-\infty, 2)$ and $(3, \infty)$

(b) $(2, 3)$

(c) $(-\infty, 2.5)$

(d) $(2.5, \infty)$

(e) $f(x)$ is not concave downward on any interval.

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11. Let $f(x) = xe^{2x}$. Then f is increasing on the following interval.

Possibilities:

(a) $(-\infty, -1/2)$

(b) $(-1/2, \infty)$

(c) $(-\infty, 1/2)$

(d) $(1/2, \infty)$

(e) $(-\infty, 0)$

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12. Find a local extreme point of $f(x) = \dfrac{\ln x}{x}$.

Possibilities:

(a) $(1, 0)$ is a local minimum point.

(b) $(1, 0)$ is a local maximum point.

(c) $(e, 1/e)$ is a local maximum point.

(d) $(e, 1/e)$ is a local minimum point.

(e) $f(x)$ has no local extreme points.

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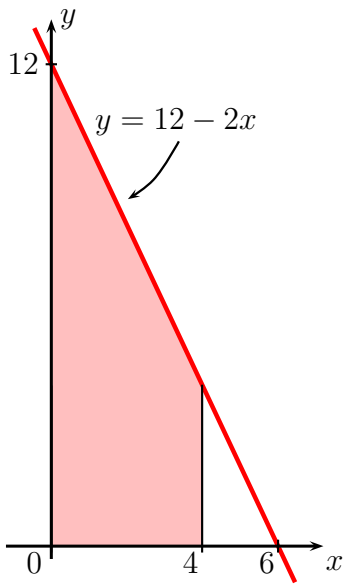
13. Evaluate the integral

$$\int_0^4 (12 - 2x)\, dx$$



Possibilities:

(a) 40

(b) 48

(c) 32

(d) 24

(e) 36

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14. Evaluate the sum $\displaystyle\sum_{k=1}^{30}(6k^2 - 2k)$.

Possibilities:

(a) $55,900$

(b) $55,800$

(c) $55,600$

(d) $55,400$

(e) $55,300$

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15. Evaluate the sum $6 + 9 + 12 + 15 + 18 + 21 + \cdots + 600$.

Possibilities:

(a) $60,287$

(b) $60,290$

(c) $60,293$

(d) $60,297$

(e) $60,300$

Some Formulas

1. **Summation formulas:**

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$$

$$\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$$

2. **Areas:**

   (a) Triangle $A = \frac{bh}{2}$

   (b) Circle $A = \pi r^2$

   (c) Rectangle $A = lw$

   (d) Trapezoid $A = \frac{b_1 + b_2}{2}\, h$

3. **Volumes:**

   (a) Rectangular Solid $V = lwh$

   (b) Sphere $V = \frac{4}{3}\pi r^3$

   (c) Cylinder $V = \pi r^2 h$

   (d) Cone $V = \frac{1}{3}\pi r^2 h$