MA 16010 Exam 3/Form 01 Fall 2014

Student's Name: _____

Student's ID Number: _____

Instructions:

1. **Do NOT turn the page until told to do so**.
2. Fill in your name and student ID in the space provided above.
3. On the scantron, fill in **your name, section number, student ID. For the test/quiz number**, put down **01 for green exam and 02 for orange exam**. Sign your name.
4. There are 12 problems and a total of 7 pages. The maximum possible score for this exam is 100, and each problem is worth the same points.
5. You can use the available space below a question or at the back of each page for your work. Turn in ONLY the scantron when you leave. Note: **you will be graded ONLY based on your scantron answer sheet**.
6. Only a one-line display scientific calculator is allowed. NO other electronic devices are allowed. No books or notes are allowed.
7. You will have 60 minutes to complete the exam.
8. **Keep your eyes on your own exam please. Try to cover your scantron answers**.
9. Good luck!

Time	Instructor	Section No.	Time	Instructor	Section No.
7:30am	D. Daniels	0031	7:30am	E. Garcia	0021
7:30am	J. Bates	0110	7:30am	L. Bloome	0107
7:30am	N. Eikmeier	0119	8:30am	N. Eikmeier	0120
8:30am	L. Bloome	0108	8:30am	J. Bates	0109
8:30am	D. Daniels	0051	8:30am	E. Garcia	0061
9:30am	B. Cox	0100	9:30am	S. Rabieniaharatbar	0103
9:30am	I. Aly	0122	10:30am	I. Aly	0121
10:30am	S. Rabieniaharatbar	0104	10:30am	B. Cox	0099
10:30am	D. Nichols	0112	11:30am	D. Stratman	0098
11:30am	Y. Luo	0094	11:30am	D. Nichols	0111
11:30am	C. Mathison	0106	12:30pm	C. Mathison	0105
12:30pm	Y. Luo	0092	12:30pm	D. Stratman	0097
12:30pm	N. Stull	0011	1:30pm	M. Lynn	0041
1:30pm	H. Delgado	0052	1:30pm	M. Perlmutter	0093
1:30pm	N. Stull	0071	1:30pm	A. Yim	0115
2:30pm	M. Lynn	0081	2:30pm	M. Perlmutter	0091
2:30pm	A. Yim	0116	3:30pm	Y. Chen	0117
3:30pm	A. Schneider	0096	3:30pm	P. Stefanov	0101
3:30pm	M. Ochoa	0113	4:30pm	M. Ochoa	0114
4:30pm	T. Terrell	0102	4:30pm	A. Schneider	0095
4:30pm	Y. Chen	0118			

1. Let $f(x) = -x^3 + 12x$. The y values of the absolute minimum and the absolute maximum of $f(x)$ over the closed interval $[-3, 5]$ are respectively:

   A. -65 and -9
   B. -65 and 16
   C. -16 and -9
   D. -16 and 16
   E. -9 and 16

2. Choose the correct statement(s) about the function $f(x) = 2x^3 - 9x^2$.

   I. $f(x)$ has a relative maximum at $x = 0$.
   II. $f(x)$ has a relative minimum at $x = 3$.
   III. $f(x)$ is concave downward on $(-\infty, \frac{3}{2})$.

   A. I only
   B. II only
   C. I & III only
   D. II & III only
   E. All of the statements are true.

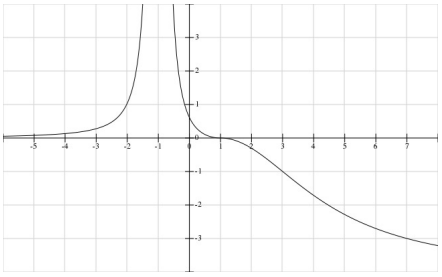
3. Find the point of inflection of $h(x) = xe^{-2x}$.

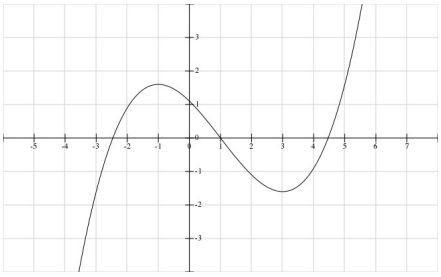
   A. $(-1, -e^2)$
   B. $\left(-\frac{1}{2}, -\frac{e}{2}\right)$
   C. $(0, 0)$
   D. $\left(\frac{1}{2}, \frac{1}{2e}\right)$
   E. $\left(1, \frac{1}{e^2}\right)$

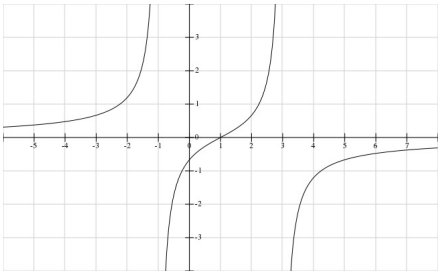
4. A function $f(x)$ satisfies the following conditions:

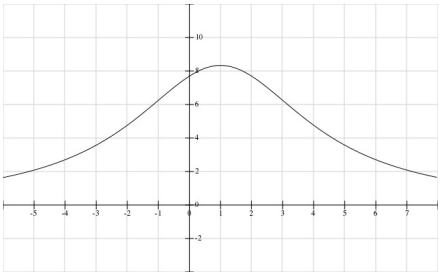
   (a) $f'(x) > 0$ on $(-\infty, -1)$
   (b) $f''(x) < 0$ on $(-1, 0)$
   (c) $f'(x) = 0$ at $x = 1$

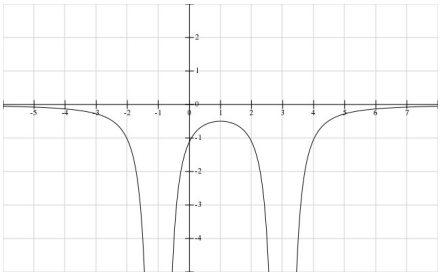
   Which of the following graphs is a possible graph of $f(x)$?

A. 

B. 

C. 

D. 

E. 

5. Which of the following functions satisfies $\lim_{x\to\infty} f(x) = -\infty$?

   A. $f(x) = \dfrac{x^4 - 16}{6x + 2}$

   B. $f(x) = \dfrac{6}{x} + 3$

   C. $f(x) = \dfrac{x^2 - 3x}{x - 5x^2}$

   D. $f(x) = \dfrac{2x - 5}{x^2 + 25}$

   E. $f(x) = \dfrac{x^3 - 27x}{7 - 4x^2}$

6. Which of the following describes all the asymptotes of the function $f(x) = \dfrac{-2x^2 - 5x + 7}{x + 3}$?

   A. $x = -3$, $y = -2$

   B. $x = -3$, $y = -2x + 1$

   C. $x = -2$, $y = 2x + 1$

   D. $x = -2$, $y = 0$

   E. $x = 3$, $y = 0$

7. A box with a square base and open top is to be made from 300 square inches of material. What is the volume of the largest box that can be made.

   A. 472 cubic inches
   B. 500 cubic inches
   C. 532 cubic inches
   D. 560 cubic inches
   E. 600 cubic inches

8. A poster is to have an area of 200 square inches with 1 inch margins on the left and right sides, and 2 inch margins on the top and bottom. Varying the dimensions of the poster changes the area of the region inside the margins. What is the maximum area inside the margins?

   A. 88 square inches
   B. 108 square inches
   C. 128 square inches
   D. 148 square inches
   E. 168 square inches

9. Find the x-coordinate of the point on the line of $y = 2x + 1$ that is closest to the point $(5, 1)$.

   A. 0

   B. 1

   C. 2

   D. 3

   E. 4

10. $\displaystyle\int \frac{3x^2 - 4}{2\sqrt{x}} dx =$

   A. $\displaystyle\frac{3}{4}\sqrt{x^3} - \frac{3}{\sqrt{x}} + C$

   B. $\displaystyle\frac{9}{4}\sqrt{x^5} + \sqrt{x} + C$

   C. $\displaystyle\frac{3}{5}\sqrt{x^5} - 4\sqrt{x} + C$

   D. $\displaystyle\frac{9}{4}\sqrt{x} + \frac{1}{\sqrt{x^3}} + C$

   E. $\displaystyle\frac{3}{7}\sqrt{x^7} - \frac{4}{3}\sqrt{x^3} + C$

11. Find the particular solution that satisfies the following differential equation and the initial conditions.

$$f''(x) = 3\cos(x), \quad f'(0) = 4, \quad f(0) = 7$$

A. $f(x) = -3\cos(x) + 4x + 7$

B. $f(x) = 3\cos(x) + 4x + 7$

C. $f(x) = -3\cos(x) + 4x + 10$

D. $f(x) = 3\cos(x) + 4x + 10$

E. $f(x) = 3\cos(x) + x + 7$

12. The growth rate of a bacteria in a Petri dish is given by

$$\frac{dP}{dt} = 2t + 7$$

where t is the time **in hours** and P is the population. If there are 1000 bacteria after **one day**, how many bacteria are there after **two days**?

A. $2,896$ bacteria

B. $3,311$ bacteria

C. $3,640$ bacteria

D. $4,624$ bacteria

E. $5,304$ bacteria