

Name: \_\_\_\_\_

Instructor: \_\_\_\_\_

**MATH 10250, Practice Exam 2**  
**July 13, 2018**

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hour and 20 minutes.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 14 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!					
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)

<b>Please do NOT write in this box.</b>	
<b>Multiple Choice</b>	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____
12.	_____
13.	_____
14.	_____
15.	_____
Total	_____

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### Multiple Choice

1.(4 pts) Compute the **elasticity of demand** when  $p = \frac{1}{2}$  given the demand equation:

$$x = 4 - 2p$$

(a)  $E\left(\frac{1}{2}\right) = \frac{1}{7}$

(b)  $E\left(\frac{1}{2}\right) = \frac{1}{3}$

(c)  $E\left(\frac{1}{2}\right) = -\frac{1}{3}$

(d)  $E\left(\frac{1}{2}\right) = 2$

(e)  $E\left(\frac{1}{2}\right) = 1$

2.(4 pts) Find the interval of **increasing** of  $f(x) = 4x - 2x^2$

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

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

(c)  $(0, 1)$

(d)  $(1, \infty)$

(e)  $(-\infty, 1)$

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3.(4 pts) If we know that the demand when  $p = 40$  is **inelastic**, then which **ONE** of the following statement is **TRUE**?

- (a) Increasing the price will not affect the revenue.
- (b) Decreasing the price will cause an increase of revenue.
- (c) Decreasing the price will cause a decrease of revenue.
- (d) Increasing the price will cause a decrease of revenue.
- (e) Not enough information to tell.

4.(4 pts) Compute the **marginal revenue** when  $x = 10$  given

$$R(x) = x^3 - 20x$$

- (a) 280      (b) 90      (c) 800      (d) 100      (e) 8000

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5.(4 pts) Find the **vertical asymptote** of  $\frac{x}{x^2 + 4x + 4}$ .

- (a)  $x = 2$  and  $x = -2$       (b)  $x = 2$       (c)  $x = 0$   
(d)  $x = -2$       (e)  $x = 0$  and  $x = -2$

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**Partial Credit**

You must show your work on the partial credit problems to receive credit!

6.(x pts.) (a) Compute  $\frac{dy}{dx}$  given

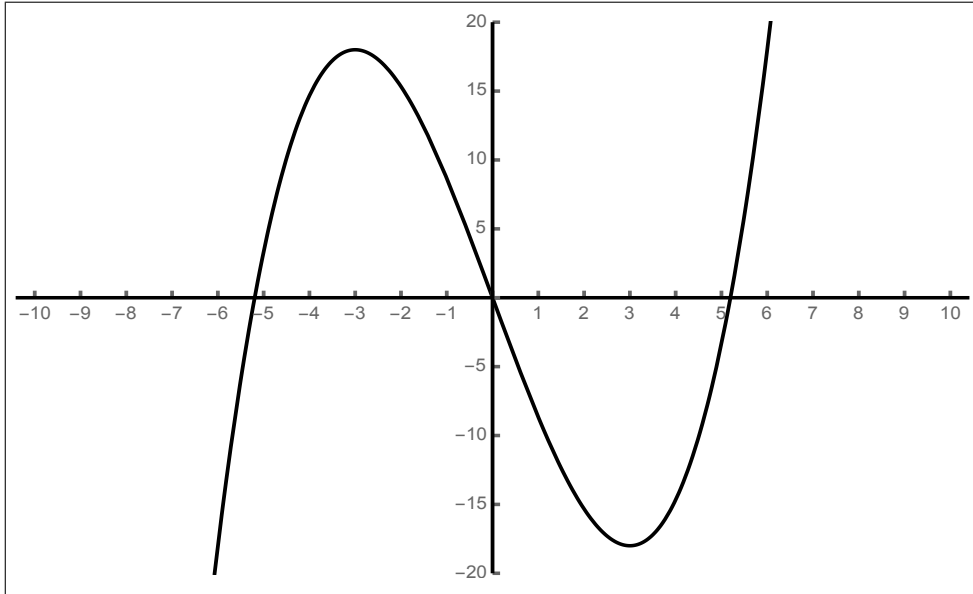
$$x^3y - x^2 = y^3 + 1$$

(b) Find the **slope** of the tangent line of the curve above at  $x = 0$  and  $y = -1$ .

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7.(x pts.) Given the graph of  $f$



Fill in the blanks:

- The interval(s) on which  $f$  is **decreasing** is: \_\_\_\_\_.
- The interval(s) on which  $f$  is **increasing** is: \_\_\_\_\_.
- All the  $x$ -coordinates of critical points of  $f$  are  $x =$ \_\_\_\_\_.
- $f'(x) \underline{\hspace{1cm}} 0$  on  $(-\infty, -3)$ .
- $f$  is concave \_\_\_\_\_ on  $(0, 6)$ .
- $f$  has an inflection point at  $x =$ \_\_\_\_\_.
- $f''(x) \underline{\hspace{1cm}} 0$  on  $(-\infty, 0)$  because  $f$  is concave \_\_\_\_\_ on  $(-\infty, 0)$ .
- $f'(3) \underline{\hspace{1cm}} 0$ .
- $f$  has a relative \_\_\_\_\_ at  $x = -3$ .
- $f(0) =$ \_\_\_\_\_.

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8.(x pts.) Given  $f(x) = x^3 + 3x^2 + 1$

(a) Find the interval of **increasing** and **decreasing** of  $f$ .

(b) Fill in the blanks:

- $f$  has a relative **maximum** at  $x =$  \_\_\_\_\_. And the value of the relative maximum is \_\_\_\_\_.
- $f$  has a relative **minimum** at  $x =$  \_\_\_\_\_. And the value of the relative minimum is \_\_\_\_\_.

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9.(x pts.) Find all the **inflection points** of  $g(x) = \frac{1}{4}x^4 - x^3 - \frac{9}{2}x^2 + 3$ .



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**10.**(x pts.) The Custom Office makes a line of executive desks. It estimated that the total cost for making  $x$  units of the Junior Executive model is

$$C(x) = 80x + 1500$$

dollars/year. Also, its revenue (in dollars) per year is given by

$$R(x) = x^3 - 20x.$$

(a) Find the **marginal profit** function.

(b) Compute the marginal profit when  $x = 20$ .

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11.(x pts.) Given the function  $f(x) = x + \frac{1}{x}$ .

(a) Find all the **critical points** of  $f$ .

(b) Find the intervals of **concavity** of  $f$ .

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**12.**(x pts.) Find the **absolute maximum value** and the **absolute minimum value** of the function

$$g(x) = x^2 - 2x - 3 \quad \text{on } [-2, 3].$$

The **absolute maximum value** of  $g$  is: \_\_\_\_\_

The **absolute minimum value** of  $g$  is: \_\_\_\_\_

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13.(x pts.) Sketch the graph of a function with the following properties

- It has a **vertical asymptote** at  $x = 0$ .
- It has a **horizontal asymptote** at  $y = 0$ .
- It is **decreasing** on  $(-\infty, 0)$  and  $(0, \infty)$ .
- It is **concave upward** on  $(0, \infty)$ .
- It is **concave downward** on  $(-\infty, 0)$ .

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**14.**(x pts.) The quantity demanded each month of the Walter Serkin recording of Beethoven's Moonlight Sonata, manufactured by Phonola Record Industries, is related to the price per compact disc. The demand equation is given by

$$p = -x + 6$$

where  $p$  denotes the unit price in dollars and  $x$  is the number of disc demanded.

(a) Phonola wants to maximize its revenue in selling this recording. How many discs should the company produce to maximize its revenue?

(b) What is the maximum revenue realizable?

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**15.**(x pts.) Suppose the whole sale price of a certain brand of eggs,  $p$  (in dollars per carton), is related to the weekly supply,  $x$  , by the equation

$$10p^2 - x^2 = 65$$

If 5 cartons of eggs,  $x = 5$ , are available at the beginning of a certain week and the price is decreasing at the rate of \$2 per carton per week, at what rate is the weekly supply changing?

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**Multiple Choice** \_\_\_\_\_

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15. \_\_\_\_\_

Total \_\_\_\_\_