MA 109 — College Algebra Fall 2011
EXAM 4 12/14/2011

Name: _____ **Sec.:** _____

Do not remove this answer page — you will turn in the entire exam. You have two hours to do this exam. 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 multiple choice and short answer questions. Record your answers on this page. For each multiple choice question, you will need to fill in the box corresponding to the correct answer. For example, if (a) 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	**10.**	**a**	b	c	d	e
2.	a	b	**c**	d	e	**11.**	**a**	b	c	d	e
3.	a	b	c	d	**e**	**12.**	**a**	b	c	d	e
4.	a	b	c	d	**e**	**13.**	a	b	c	**d**	e
5.	a	b	c	**d**	e	**14.**	a	b	c	**d**	e
6.	a	**b**	c	d	e	**15.**	a	**b**	c	d	e
7.	**a**	b	c	d	e	**16.**	a	b	c	d	**e**
8.	a	b	c	**d**	e	**17.**	a	b	**c**	d	e
9.	a	b	c	**d**	e	**18.**	a	**b**	c	d	e

For grading use:

Total	
	(out of 90 pts)

Multiple Choice Questions

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

1. Solve.

$$4x^2 - 7x + 1 = 0$$

Possibilities:

(a) $\dfrac{7 \pm \sqrt{33}}{8}$

(b) $\dfrac{-7 \pm \sqrt{33}}{8}$

(c) $\dfrac{7 \pm \sqrt{65}}{8}$

(d) $\dfrac{-7}{8} \pm \sqrt{33}$

(e) $\dfrac{-7 \pm \sqrt{65}}{8}$

2. Find the vertex of the parabola given by $y = 2x^2 - 5x + 6$.

Possibilities:

(a) $(-5/4, -23/8)$

(b) $(23/8, 5/4)$

(c) $(5/4, 23/8)$

(d) $(123/8, 5/4)$

(e) $(-5/4, 123/8)$

3. Let $f(x) = \sqrt{8 - x}$. Find the domain of $f(x)$.

Possibilities:

(a) $(-\infty, 8)$

(b) $[8, \infty)$

(c) $(-8, \infty)$

(d) $(-\infty, -8) \cup (8, \infty)$

(e) $(-\infty, 8]$

4. If $(-4, 12)$ lies on the graph of $y = f(x)$, find a point on the graph of $y = g(x)$ if $g(x) = 2f(x - 3)$.

Possibilities:

(a) $(-2, 15)$
(b) $(-7, 6)$
(c) $(-7, 24)$
(d) $(-1, 6)$
(e) $(-1, 24)$

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5. Find an equation for the line through the points $(-5, 2)$ and $(13, 8)$.

Possibilities:

(a) $y - 8 = -\frac{18}{6}(x - 13)$
(b) $y + 2 = \frac{6}{18}(x - 5)$
(c) $y - 13 = \frac{6}{18}(x - 8)$
(d) $y - 2 = \frac{6}{18}(x + 5)$
(e) $y - 5 = -\frac{18}{6}(x - 2)$

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6. Let $f(x) = -4x^{13} + 2x^4 - 6x + 1$. Determine the end behavior of $y = f(x)$.

Possibilities:

(a) $y \to 1$ as $x \to \infty$ and $y \to \infty$ as $x \to -\infty$
(b) $y \to -\infty$ as $x \to \infty$ and $y \to \infty$ as $x \to -\infty$
(c) $y \to \infty$ as $x \to \infty$ and $y \to \infty$ as $x \to -\infty$
(d) $y \to -\infty$ as $x \to \infty$ and $y \to -\infty$ as $x \to -\infty$
(e) $y \to -\infty$ as $x \to \infty$ and $y \to 1$ as $x \to -\infty$

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7. What quantity, x, of a 55% acid solution must be mixed with a 20% acid solution to produce 800 mL of a 46.25% solution?

Possibilities:

(a) 600 mL
(b) 500 mL
(c) 200 mL
(d) 300 mL
(e) 700 mL

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8. A manufacturer finds that the revenue generated by selling t trinkets is given by the function $R(t) = 4800t - .4t^2$, where the revenue $R(t)$ is measured in dollars. How many **trinkets** must the manufacturer sell to maximize her revenue?

Possibilities:

(a) 14400 trinkets
(b) 29400 trinkets
(c) 12000 trinkets
(d) 6000 trinkets
(e) 16000 trinkets

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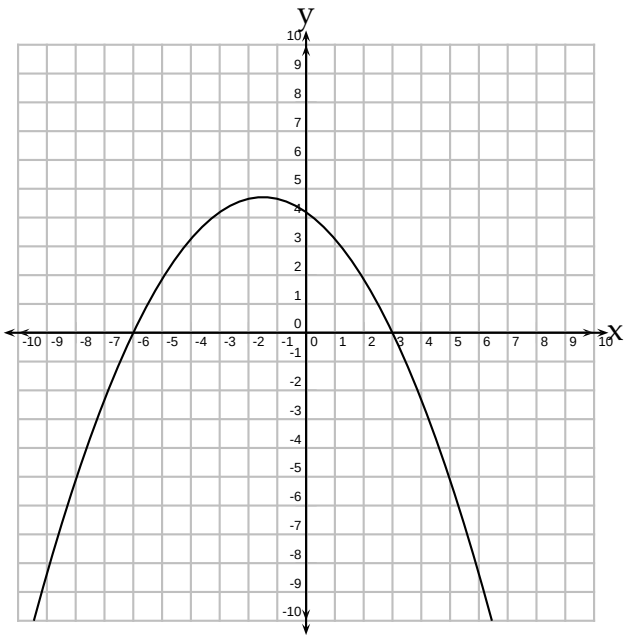
9. The graph of the polynomial $y = P(x)$ is shown below. What conclusions can you make from this graph?



(I). $(x + 6)$ is a factor of $P(x)$

(II). When $P(x)$ is divided by $(x+3)$ the remainder is zero.

(III). $x = 3$ is a root with even multiplicity.

Possibilities:

(a) (I), (II), and (III) are all true.
(b) Only (I) and (II) are true.
(c) Only (II) is true.
(d) Only (I) is true.
(e) Only (II) and (III) are true.

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10. Let $P(x) = 27x^7 + 4x + 2$. List all possible rational zeros of $P(x)$ given by the Rational Zeros Theorem (but do not check to see which are actually zeros).

Possibilities:

(a) $\pm 1, \pm 1/3, \pm 1/9, \pm 1/27, \pm 2, \pm 2/3, \pm 2/9, \pm 2/27$

(b) $\pm 1, \pm 3, \pm 9, \pm 27, \pm 2, \pm 2/3, \pm 2/9, \pm 2/27$

(c) $\pm 1, \pm 3, \pm 9, \pm 27, \pm 1/2, \pm 3/2, \pm 9/2, \pm 27/2$

(d) $\pm 1, \pm 27, \pm 2/27$

(e) $\pm 1, \pm 27, \pm 27/2$

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11. Let $r(x) = \dfrac{x^2 + 6x - 91}{x^2 - 9x + 18}$. Find the vertical asymptotes of $r(x)$.

Possibilities:

(a) $x = 3$ and $x = 6$

(b) $x = 7$ and $x = -13$

(c) $y = 3$ and $y = 6$

(d) $y = 7$ and $y = -13$

(e) $x = 1$

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12. The sales tax (in dollars) for an item costing x dollars can be modeled by the function $T(x) = 0.06x$. What does $T^{-1}(1.75)$ represent?

Possibilities:

(a) The original cost of an item if the sales tax is \$1.75.

(b) The original cost of an item divided by 1.75

(c) The sales tax for an item that costs \$1.75.

(d) One divided by the original cost of an item.

(e) The total tax for an item divided by 1.75

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13. Solve the inequality.

$$(x+2)(x-4) \geq 0$$

Possibilities:

(a) $(-\infty, -2) \cup (4, \infty)$
(b) $[-2, 4]$
(c) $(-\infty, \infty)$
(d) $(-\infty, -2] \cup [4, \infty)$
(e) $(-2, 4)$

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14. Solve for t.

$$16^{t-5} = 4.$$

Possibilities:

(a) $\frac{7}{2}$
(b) 11
(c) $\frac{9}{2}$
(d) $\frac{11}{2}$
(e) 6

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15. Let $f(x) = 4x^2 + 6$. Find $\frac{f(x+h) - f(x)}{h}$.

Possibilities:

(a) $\frac{4h^2 + 6}{h}$
(b) $8x + 4h$
(c) $4h^2 + 6$
(d) $\frac{8xh + 4h^2 + 12}{h}$
(e) $-8x - 4h$

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16. Find the quotient and remainder of the division problem.

$$\frac{x^4 + x^2}{x^2 + 6}$$

Possibilities:

(a) Quotient: $x^2 + 7$ Remainder: 42
(b) Quotient: x^2 Remainder: $-5x^2$
(c) Quotient: x^2 Remainder: $7x^2$
(d) Quotient: $x^2 + 7$ Remainder: -42
(e) Quotient: $x^2 - 5$ Remainder: 30

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17. Let $f(x) = -4x^2 - 3$. Find the average rate of change of $f(x)$ between $x = -5$ and $x = 3$.

Possibilities:

(a) $\frac{1}{8}$
(b) -8
(c) 8
(d) 64
(e) -64

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18. Solve the equation for x.

$$lh = z^3 + px.$$

Possibilities:

(a) $\frac{h - z^3 l}{lp}$
(b) $\frac{-z^3 + lh}{p}$
(c) $\sqrt[3]{db - px}$
(d) $\sqrt[3]{\frac{db - z}{p}}$
(e) $\frac{lh - pz^3}{p}$

Formula Sheet:

Compound Interest: If a principal P_0 is invested at an interest rate r for a period of t years, then the amount $P(t)$ of the investment is given by:

$$P(t) = P_0\left(1 + \frac{r}{n}\right)^{nt} \quad \text{(if compounded } n \text{ times per year)}$$

$$P(t) = P_0\, e^{rt} \quad \text{(if compounded continuously).}$$

Change of Base Formula: Let a and b be two positive numbers with $a, b \neq 1$. If $x > 0$, then:

$$\log_b x = \frac{\log_a x}{\log_a b}$$