Math 119 College algebra
Final Exam Review

Review Chapter
Sections R.1, R.2, R.4, R.5, R.6, R.7, R.8, R.9

1. Simplify the following expression. $4(2x^2 - 3x) - 3x(x^2 + 4x - 5)$

A. $5x^2 - 24x + 15$
B. $3x^3 + 20x^2 - 27x$
C. $-24x^5 - 60x^4 + 264x^3 - 180x^2$
D. $-3x^3 + 8x^2 + x - 5$
E. $-3x^3 - 4x^2 + 3x$

2. Completely factor the following. $4x^2 - 10x - 24$

A. $2(2x + 3)(x - 4)$
B. $4(x - 4)(x - 6)$
C. x = -1.5, 4
D. $2(2x - 3)(x + 4)$
E. $2(2x + 2)(x - 12)$

3. How many of the following equations are true for all real numbers?

I. $a^2a^3 = a^6$
II. $\frac{1}{5x} = 5x^{-1}$
III. $(a^m)^n = a^{mn}$
IV. $\frac{1}{a^n} = a^{-n}$

A. One is true.
B. Two are true.
C. Three are true.
D. Four are true.
E. None are true.

4. Simplify the following expression. $\dfrac{(-3)^3 x^2 (2y)^3}{(xy)^{-2}}$

A. $-216x^4y^5$
B. $216y$
C. $\dfrac{-16x^4y^5}{27}$
D. $54y$
E. $\dfrac{2x^4y^5}{27}$

5. Simplify the following expression. $\sqrt{32x^5y^{12}}$

A. $8xy\sqrt{x}$
B. $\sqrt{2xy}$
C. $4x^2y^3\sqrt{2x}$
D. $4x^2y^6\sqrt{2x}$
E. $16x^2y^6\sqrt{x}$

6. Factor $6x^3 + 3x^2 - 18x$ completely. One of the factors is
A. $2x + 3$
B. $2x - 3$
C. $x - 2$
D. $4x + 3$
E. $x - 4$

7. Completely simplify the following. $\dfrac{5*3^2 - 7}{2} + 9*(1-5)^2$

a.) 365.5
b.) 253
c.) -35
d.) 163
e.) 185.5

8. Completely factor the following. $3x^2(x-2)^2 + 6x(x-2)$

a.) $3x(x-2)(x^2 - 2x + 2)$
b.) $3x(x-2)(x+2)$
c.) $3x^2 - 6x + 6$
d.) $3x^4 - 12x^3 + 18x^2 - 12x$
e.) $3x^2 + 6x$

Chapter 1
Sections 1.1 through 1.7

1. Marilyn sells knitted sweaters. She has done some research and has found that if she sells an adult sweater for $35, she will sell 34 of them in a month. If she raises her price to $40, she will only sell 23. Assume the relationship between price and number sold is linear. Find this relationship. Let x represent the price and y represent the number sold.

A. $y = -.07x^2 + 3.13x + 10$

B. $y = .45x + 18.25$

C. $y = -2.2x + 111$

D. $y = -2.2x + 23$

E. $y = .14x + 29.1$

2. Find the distance between the two points $P_1 = (10, -2)$ and $P_2 = (-5, 7)$.

A. 7.07
B. 17.49
C. 5.59
D. 15.81
E. 2.50

3. Find the x and y intercepts of the function $y = 3x^2 + 4x - 5$.

A. x = -5, y = -5
B. x = 3 and 4, y = -5
C. x = 2.12 and .79, y = 0
D. x = -2.12 and .79, y = -5
E. x = -.67, y = -6.33

4. Solve the equation $4 = 2x^2 + 7x$.

A. $(x + 4)(2x - 1)$

B. x = 4, .5
C. x = -4, .5
D. x = .5, 1.75
E. x = -1.75, -6.13

5. Melinda has $10,000 to invest. She will split the $10,000 into two separate accounts, one paying 5% and the other paying 7%. If the total interest she needs to earn in one year is $620, determine which formula should be used to solve for x, where x represents the amount invested in the 5% account. Assume investments earn simple interest.

A. $.05x + .07(10{,}000) = 620$
B. $.07x + .05(10{,}000 - x) = 10{,}000$
C. $.05x + .07(10{,}000 - x) = 620$
D. $.05x + .07(10{,}000 - x) = 10{,}000 - x$
E. $.5x + .7(10{,}000 - x) = 620$

6. Find the equation of the line that passes through the point (4, -5) and is perpendicular to the line $y + 2x - 3 = 0$.

A. $y = -2x + 3$

B. $y = \frac{1}{2}x - 3$

C. $y = \frac{1}{2}x - 7$

D. $y = 2x - 5$

E. $y = -\frac{1}{2}x - 3$

7. Solve the following inequality. Write your answer in inequality notation.

$$-3 \le 2x + 4 < 5$$

A. $-3.5 < x < 1$

B. $-3.5 \le x < 1$

C. $-3.5 \le x < .5$

D. $.5 \le x < 4.5$

E. $-3.5 \ge x > .5$

8. Solve the following equation. $\sqrt{18 - 3x} = x$

A. $x = -6, 3$

B. $x = -3, 6$

C. $x = 3$

D. $x = 6$

E. $x = 4.5$

9. Given the graph of $f(x)$ to the right, approximate the values of x that result in a y value of 0.

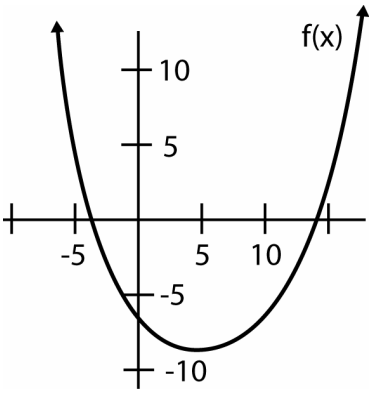
A. $x = -4, 14$

B. $x = -7, -4, 14$

C. $x = -7$

D. $x = 5$

E. $x = -5, 5, 10$



Chapter 2 and Section 5.3
Sections 2.1, 2.3, 2.4, 5.3

1. Let $f(x) = 2x^2 - x + 4$. Find and simplify $f(x + 1)$.

A. $2x^3 + x^2 + 3x + 4$
B. $2x^2 + 3x + 5$
C. $4x^2 + 7x - 1$
D. $4x^2 + 7x + 7$
E. $2x^2 - x + 5$

2. Use your calculator to graph the function $g(x) = -4x^2 + 5x - 15$. Which of the following is true concerning its domain and range?

A. The domain is $(-\infty, \infty)$. The range is $(-\infty, \infty)$.
B. The domain is $(-\infty, \infty)$. The range is (-15, 0).
C. The domain is $(-\infty, -15)$. The range is $(-\infty, \infty)$.
D. The domain is $(-\infty, \infty)$. The range is $(-\infty, -13.44]$.
E. The domain is $(-\infty, \infty)$. The range is $(.63, -13.44]$.

3. Solve the following equation. $2x^2 = 3x + 4$

A. $x = -.75 \pm 1.20i$
B. x = -.85, 2.35
C. x = -5.13, .75
D. x = -.75
E. x = 1.45, 11.05

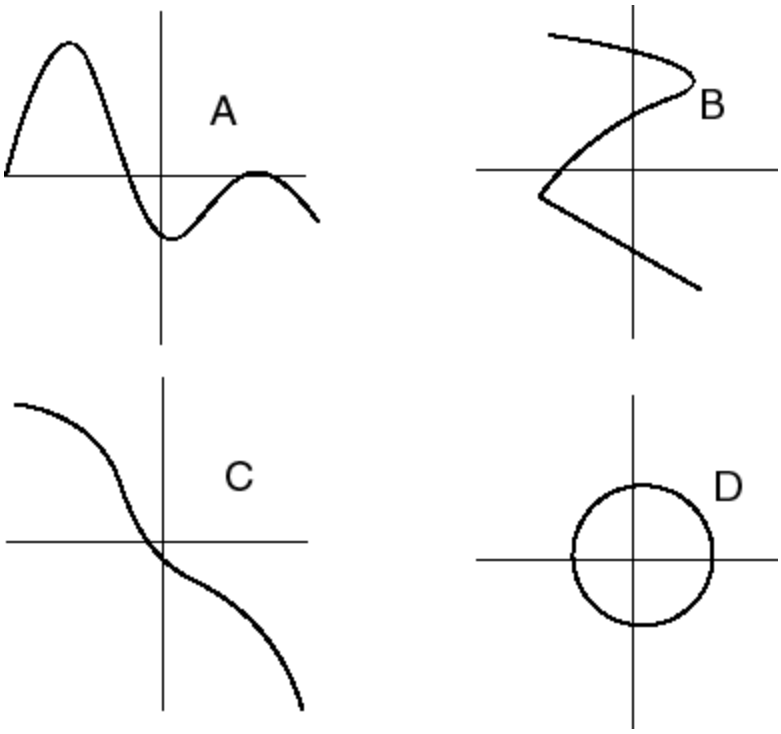
4. Let $g(x) = 3x^2 - 5x$. Find and simplify $g(x - 2)$.

A. –22
B. $3x^2 - 17x + 2$
C. $3x^2 - 17x + 22$
D. $3x^2 + 7x + 22$
E. $3x^2 - 5x - 2$

5. Find the domain of the following function. $f(x) = \dfrac{3x}{x^2 - 4}$

A. all real numbers
B. all real numbers except 2
C. all real numbers except -2 and 2
D. all real numbers except -2, 0, and 2
E. all real numbers except 0

6. Which of the following graphs are functions?



A. Graphs A and B are the only functions pictured.
B. Graph A is the only function pictured.
C. Graphs A and C are the only functions pictured.
D. Graphs B and D are the only functions pictured.
E. None of the graphs are functions.

7. When the price per item is p and the quantity sold is x, the weekly demand equation for a certain product is given by $p = -.4x + 500$ for $0 \le x \le 1250$. Revenue is found by multiplying price per item times number sold. What quantity will maximize the weekly revenue?
A. 500
B. 1250
C. 156,250
D. 250
E. 625

8. Martin's Paint Shop knows that to buy x gallons of paint will cost them $C(x) = 2x^2 - 100x + 2000$ dollars. What is the minimum cost they will incur?
A. 25
B. 750
C. 2000
D. 50
E. 5750

9. Let $g(x) = -3x^2 - 9x + 7$. Find $g(-4)$.

A. $g(-4) = -77$

B. $g(-4) = 12x^2 + 36x - 28$

C. $g(-4) = 91$

D. $g(-4) = 19$

E. $g(-4) = -5$

10. What is the domain of the function $g(x) = \dfrac{3x^2 + 4}{x^2 + 2x - 3}$?

A. all real numbers

B. all real numbers except 3

C. all real numbers greater than or equal to 0

D. all real numbers in between -3 and 1

E. all real numbers except -3 and 1

11. Let $h(x) = 2x^2 + 8x$. Find and simplify $h(x - 3)$.

A. $2x^2 + 8x - 3$

B. $2x^3 + 2x^2 - 24x$

C. $2x^2 + 2x - 24$

D. $2x^2 - 4x - 6$

E. $2x^2 + 2x + 9$

Chapter 3
Sections 3.2, 3.3, 3.4, 3.5

1. Find the average rate of change from $x = 2$ to $x = 5$ for the function $f(x) = 2x^2 + 4x$.
The formula is $\frac{f(5) - f(2)}{5 - 2}$.
A. 54
B. 16
C. 70
D. 18
E. 3

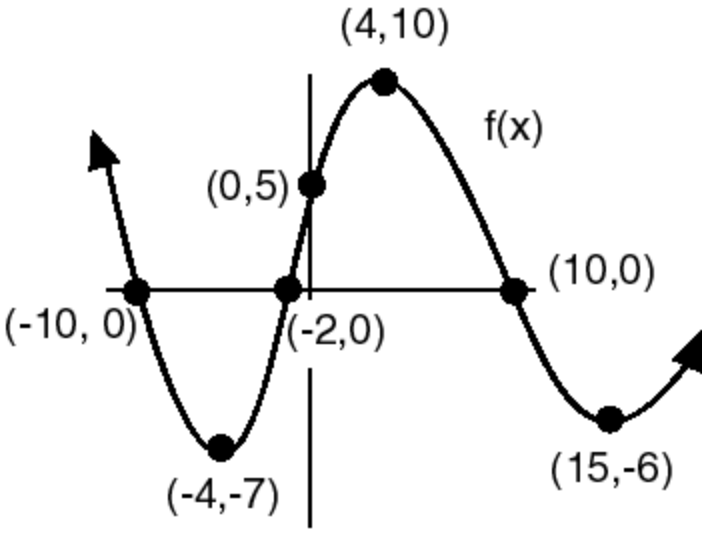
2. Let $f(x) = 5x + 3$ and $g(x) = 2x^2 - 4$. Find and simplify $(f \circ g)(x)$.
A. $10x^3 + 6x^2 - 20x - 12$
B. $50x^2 + 30x + 14$
C. $2x^2 + 5x - 1$
D. $50x^2 + 60x + 14$
E. $10x^2 - 17$

3. Suppose you are given the graph of $y = f(x)$. How will the graph of $y = f(x - 4) + 5$ be translated?
A. 4 units down, 5 units up
B. 4 units left, 5 units up
C. 4 units right, 5 units down
D. 4 units up, 5 units down
E. 4 units right, 5 units up

4. You are given the graph of $y = f(x)$. What transformations are needed to make the graph of $y = 3*f(x + 2)$?
A. vertical shift up 2 units, vertical stretch by a factor of 3
B. horizontal shift to right 2 units, vertical stretch by a factor of 3
C. horizontal shift to left 2 units, vertical stretch by a factor of 3
D. horizontal shift to right 3 units, vertical compression by a factor of 2
E. horizontal shift to right 3 units, vertical shift up 2 units

5. A stone is dropped into a pool of water, creating circular ripples that travel outward according to the equation $r(t) = 2t$ where t is the time (in seconds) and $r(t)$ is the radius (in centimeters) of the outermost ripple. The area of the region inside the outermost ripple is given by $A(r) = p * r^2$ where r is the radius and $A(r)$ is the area of the circular region. Find the area of the region inside the outermost circular ripple after 3 seconds.
A. $Area = 9p$
B. $Area = 36p$
C. $Area = 18p$
D. $Area = 64p$
E. $Area = 6p$

Use the graph of $f(x)$ below to answer the following three questions.



6. Determine the interval(s) over which $f(x)$ is increasing.
A. (-4, 4) and (15, ∞)
B. ($-\infty$, -4) and (4, 15)
C. ($-\infty$, -10) and (-2, 10)
D. (-7, 10) and (-6, ∞)
E. ($-\infty$, 5) and (15, ∞)

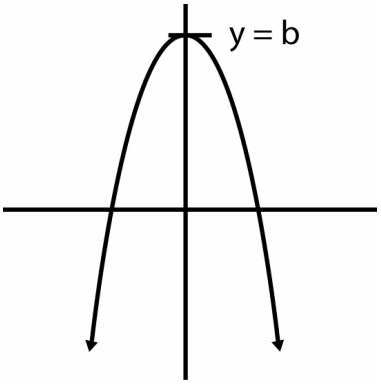
7. What is the range of the pictured $f(x)$?
A. ($-\infty, \infty$)
B. [-7, 10]
C. [-10,10]
D. [-7, ∞)
E. [-4, 4]

8. What is the value of $f(4)$?
A. all real numbers
B. $f(4) = 4$
C. $f(4) = 0$
D. $f(4) = -7$
E. $f(4) = 10$

9. Use your calculator to graph $g(x) = -4x^3 + 5x - 10$. Where is the graph of $g(x) = -4x^3 + 5x - 10$ decreasing?

A. $(-\infty, -12.15)$ and $(-7.85, \infty)$
B. $(-1.66, \infty)$
C. $(-\infty, -.65)$ and $(.65, \infty)$
D. $(-.65, .65)$
E. $(-.65, -12.15)$ and $(.65, -7.85)$

10. The graph to the right is a transformation of the function $y = x^2$. Which of the following could be its formula?



A. $y = b$
B. $y = (x + b)^2$
C. $y = -x^2 + b$
D. $y = -(x + b)^2$
E. $y = -(x - b)^2$

Chapter 4
Sections 4.1, 4.2, 4.3, 4.4, 4.5

1. Describe the end behavior of $G(x) = -4x^4 + 6x^3 - 250x - 12$.

A. as $x \to -\infty, y \to -\infty$ and as $x \to \infty, y \to -\infty$

B. as $x \to -\infty, y \to \infty$ and as $x \to \infty, y \to \infty$

C. as $x \to -\infty, y \to -\infty$ and as $x \to \infty, y \to \infty$

D. as $x \to -\infty, y \to \infty$ and as $x \to \infty, y \to -\infty$

E. as $x \to -\infty, y \to 0$ and as $x \to \infty, y \to -12$

2. Given the function $f(x) = 4000(x-2)^4(x+15)^3(x-1)$, which of the following is true concerning its zeros (or roots)?

A. The function has zeros (or roots) at -2, 15, and -1.
B. The function has zeros (or roots) at -2, -15, and 1.
C. The function has zeros (or roots) at 2, -15, and 1.
D. The function has zeros (or roots) at 4000, -2, 15, and -1.
E. The function has zeros (or roots) at -2, 15, and 1.

3. Solve the following inequality. Write your answer in interval notation. $\dfrac{5x^2 - 6x}{x-3} \le 75$

A. [3.56, 12.64]
B. (- ∞ , 3] and [3.56, 12.64]
C. [0, 1.2] and (12.64, ∞)
D. (- ∞ , 3) and [3.56, 12.64]
E. (3.56, 12.64)

4. Which of the following is true concerning the vertical asymptotes of $f(x) = \dfrac{4x^2 + 5}{3x^2 - 7x}$?

A. The vertical asymptotes occur at 2.33 and 0.
B. The vertical asymptotes occur at 3 and -7.
C. The vertical asymptotes occur at -2.33 and 0.
D. The vertical asymptote occurs at 1.33.
E. The vertical asymptotes occur at -3 and -7.

5. Solve $8x^2 + 13x^5 - 4x + 1 < 3$. Write your answer in interval notation.

A. (- ∞ , -1) and (-.31, .63)
B. (- ∞ , -.31)
C. (-1, ∞)
D. (- ∞ , -.92) and (-.31, .63)
E. (- ∞ , -.92] and [-.31, .63]

6. Form a third-degree polynomial that has roots at -2, 0, and 5. Simplify your answer.

A. $y = x^3 - 3x^2 - 10x$

B. $y = x^2 - 3x - 10$

C. $y = x^3 + 3x^2 - 10x$

D. $y = x^4 - x^3 - 16x^2 - 20x$

E. $y = -10x^3$

7. Determine how many of the following expressions are polynomials.

I. $\dfrac{4x^2 + 3x}{2x - 5}$

II. $5x^6 + 4x^3 - 9x$

III. $\sqrt{3}x^5 - 4x^{10} + 3x$

IV. $\sqrt{3x^2 - 4}$

A. They are all polynomials.
B. Only one is a polynomial.
C. Two are polynomials.
D. Three are polynomials.
E. None are polynomials.

8. Find the domain of the function $h(x) = \dfrac{2x^2 - 6x}{x^2 + x - 12}$.

A. all real numbers except -4 and 3
B. all real numbers
C. all real numbers except -3 and 4
D. all real numbers less than -4 or greater than 3
E. all real numbers in between -4 and 3

9. Solve $\dfrac{5x^2 + 3x^3 - 4}{x^2 - 8x + 15} > 0$.

A. [.74, 3] and [5, ∞)
B. (-∞, ∞)
C. [0, ∞)
D. (.74, 3)
E. (.74, 3) and (5, ∞)

Chapter 6
Sections 6.1 through 6.7

1. Write the expression below as a sum or difference of logs. Express powers as factors.

$$\log \frac{4x^2}{(x-3)^4}$$

A. $\log 4x^2 - 4\log x - 4\log 3$

B. $\log 4x^2 - 4\log(x-3)$

C. $8\log x - \log(x-3)^4$

D. $2\log(4x) - 4\log(x-3)$

E. $2\log 4x - \dfrac{\log(x-3)}{\log 4}$

2. Which of the following statements are true?

I. $\log \dfrac{x}{2} = \log x - \log 2$ II. $\ln \dfrac{x}{2} = \dfrac{\ln x}{\ln 2}$ III. $\log(1) = 0$ IV. $\log_b b = 1$

A. all are true
B. I and II only
C. III and IV only
D. I, III, and IV only
E. I only

3. Convert the logarithmic equation into an equivalent exponential equation.

$$\log_4(x-7) = 3$$

A. $4^3 = x - 7$

B. $3^4 = x - 7$

C. $(x-7)^3 = 4$

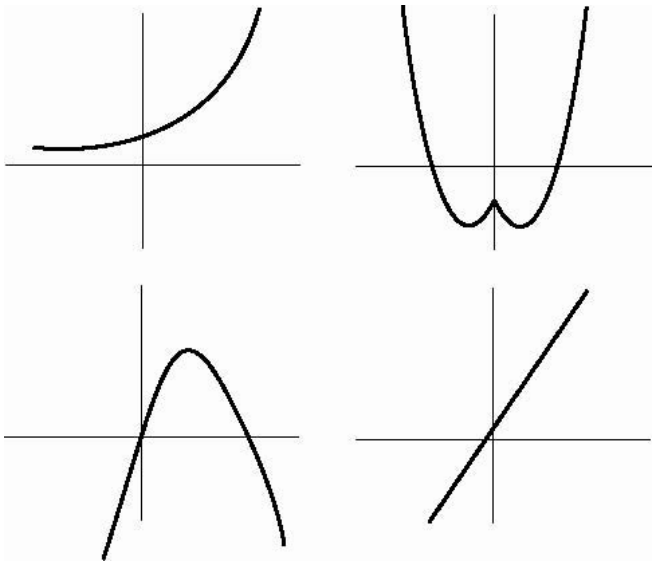
D. $(x-7)^4 = 3$

E. $(x-7)^{\log} = 4^3$

4. Rebecca invests $500 into an account paying 6% compounded continuously. How long will it take for her money to grow to $1500? Round your answer to the nearest year.

A. 2 years
B. 13 years
C. 18 years
D. 33 years
E. 50 years

5. How many of the following functions have inverses that are functions?



A. Zero
B. Exactly One
C. Exactly Two
D. Exactly Three
E. Exactly Four

6. The value of some baseball cards rises so quickly, it can be assumed to follow the law of uninhibited growth. The formula for the value of a certain baseball card can be expressed by $A(t) = A_0 e^{.0511t}$ where A_0 is the value in the year 2000 and t is the number of years since 2000. If a certain card is worth \$9 in 2000, how many years will it take for the baseball card to be worth \$30? Round your answer to the nearest whole number.

A. 9 years
B. 10 years
C. 24 years
D. 42 years
E. 47 years

7. Solve the following equation. $\log_2(x+4) - \log_2(x^2) = 5$

A. x = -.31, .31
B. x = -.34, .37
C. x = .37
D. x = .13
E. There is no solution.

8. Stanley needs to make $15,000. He has decided to invest $5,000 in an account that pays 5% compounded monthly. Find the equation that you would use to solve the problem "How long must he leave his money in the account?" You are not required to solve the equation.

A. $15000 = 5000e^{.05*t}$

B. $15000 = 5000\left(\frac{1+.05}{12}\right)^{12t}$

C. $10000 = e^{12t}$

D. $15000 = 5000\left(1+\frac{.05}{12}\right)^{12t}$

E. $15000 = 5000\left(\frac{1+.05}{12}\right)^{.05t}$

9. Write the following expression as a single logarithm. $3\log\left(2x^2\right) - \log\left(x-3\right)$

A. $3\log\left(\frac{2x}{-3}\right)$

B. $3\log\left(\frac{2x^2}{x-3}\right)$

C. $\frac{3\log\left(2x^2\right)}{\log\left(x-3\right)}$

D. $\log\left(\frac{2x^5}{\log(x-3)}\right)$

E. $\log\left(\frac{8x^6}{x-3}\right)$

10. Find the inverse of the following function. $y = \frac{3x-4}{7}$

A. $y = \frac{3x+4}{7}$

B. $y = \frac{7x}{3}+4$

C. $y = \frac{7x+4}{3}$

D. $y = 3\left(7x-4\right)$

E. $y = \frac{7x-4}{3}$

Correct answers			
Review Chapter		**Chapter 3**	
Number	**Answer**	**Number**	**Answer**
1	E	6	A
2	A	7	D
3	B	8	E
4	A	9	C
5	D	10	C
6	B		
7	D		
8	A		
Chapter 1			
Number	**Answer**		
1	C		
2	B		
3	D	**Chapter 4**	
4	C	**Number**	**Answer**
5	C	1	A
6	C	2	C
7	C	3	D
8	C	4	A
9	A	5	D
Chapter 2		6	A
Number	**Answer**	7	C
1	B	8	A
2	D	9	E
3	B		
4	C		
5	C	**Chapter 6**	
6	C	**Number**	**Answer**
7	E	1	B
8	B	2	D
9	E	3	A
10	E	4	C
11	D	5	C
Chapter 3		6	C
Number	**Answer**	7	B
1	D	8	D
2	E	9	E
3	E	10	C
4	C		
5	B		