**REVIEW #1**
(Complete on separate papers--due the day of Test #1)

**Chapter 2 Review**
1. Find the x- and y- intercepts and use them to graph the equation: $2x - 3y = 6$

2. Graph each equation:
   a. $7y - 1 = 6$
   b. $5(y - x) = x + 5y$

3. Find the distance between $P(-7, 11)$ and $Q(3, -13)$.

4. Find the midpoint of the line segment connecting $P(3, -6)$ and $Q(-1, -6)$.

5. A car purchased for $17,000 is expected to depreciate according to the formula $y = -1360x + 17000$. When will the car be worthless?

6. Find the slope of each of the following lines:
   a. The line through the points $P(-4,3)$ and $Q(-4, -3)$.
   b. The line given by the equation $8y + 2x = 5$.
   c. The line given by the equation $2y = 5$.

7. A small business predicts sales according to the straight-line method. If sales were $2,000 the first year and $12,500 the third year, find the rate of growth in dollars per year.

8. Write each equation of each line with the given properties. Write your answer in slope-intercept form.
   a. $m = -3$; passing through $P(3,5)$
   b. Passing through $P(4,0)$ and $Q(6, -8)$
   c. $m = \sqrt{2}$; $b = \frac{2}{3}$
   d. Passing through $P(-6,3)$ and parallel to the line $y + 3x = -12$
   e. Passing through $P(1, -5)$ and perpendicular to the line $y = -\frac{4}{3}x + 8$

9. Find the slope and y-intercept and use them to graph the line $3(y - 4) = -2(x - 3)$.

10. Determine whether the lines are parallel, perpendicular, or neither.
    a. $x = 3y + 4; y - 7 = -3x$
    b. $3x + 6y = 1; y = \frac{1}{2}x$

11. A Bose Wave radio costs $555 when new and is expected to be worth $80 after 5 years.
    a. Find the depreciation equation.
    b. What will it be worth after 3 years?

12. For each of the following equations, find (i) the intercepts and (ii) any symmetries.
    a. $y = x^3 - 9x$
    b. $x^2 + y = 1$
    c. $|x| = |y|

13. Write the equation of the circle in standard form with ends of the diameter at $(-1,2)$ and $(3,4)$. 
Chapter 3 Review

1. Find the domain of each of the following functions. Use interval notation.
   a. \( f(x) = \frac{x}{x^2 - 4} \)
   b. \( f(x) = \sqrt{2x - 1} \)

2. Which test is used to determine if a graph represents a function?

3. The Circle K is planning a service project for children at a local children’s home. They plan to rent a *Dora the Explorer Moonwalk* for the event. The cost of the moonwalk will include a $60 delivery fee and $45 for each hour.
   a. Express the cost \( C \) as a function of the hours \( h \).
   b. How much will it cost for 3 hours?
   c. How long can you rent it for $330?

4. Sketch a graph of \( f(x) = -x^2 + 2x \). Make sure to find and label all the required points on your graph
   a) Vertex: 
   b) Axis of Symmetry: 
   c) Opens UP/DOWN; MIN/MAX
   d) y-intercept: 
   e) x-intercept(s): 
   f) Domain: 
   g) Range: 

5. Sketch a graph of \( y = 2(x+1)^2 + 3 \). Make sure to find and label all the required points on your graph
   a) Vertex: 
   b) Axis of Symmetry: 
   c) Opens UP/DOWN; MIN/MAX
   d) y-intercept: 
   e) x-intercept(s): 
   f) Domain: 
   g) Range: 
6. The amount \( A \) of money on deposit for \( t \) years in an account earning simple interest is a linear function of \( t \). Express that function as an equation if \( A = 96 \) when \( t = 3 \) and \( A = 116 \) when \( t = 5 \).

7. A wholesaler of appliances finds that she can \((2400 - p)\) sell flat-paneled televisions when the price is \( p \) dollars. Thus, her revenue is given by the function \( R(t) = p(2400 - p) \).
   a. What price will maximize revenue?
   b. What is its maximum revenue?

8. For each of the following functions:
   i. Find any symmetries (y-axis or origin)
   ii. Find the x- and y-intercepts
   iii. Determine whether the functions are even, odd, or neither
   iv. Sketch the graph. You may need additional points.
   a. \( f(x) = -x^3 + 3x^2 \)
   b. \( f(x) = x^4 - 5x^2 + 4 \)

9. Determine the intervals in which the function is increasing, decreasing, or constant.

10. Consider the piecewise-defined function \( f(x) = \begin{cases} |x|, & x < 0 \\ x + 2, & x \geq 0 \end{cases} \)
    a. Evaluate \( f(-2) \), \( f(0) \), and \( f(2) \)
    b. Graph \( f(x) \)

11. Graph each of the following functions using a combination of translations, stretching and shrinking, and reflections of the toolkit functions. State the transformations used. Plot at least 3 points for each.
   a. \( f(x) = -2[x + 3] \)
   b. \( f(x) = (x - 1)^2 + 4 \)
   c. \( f(x) = \sqrt{-x} + 3 \)
   d. \( f(x) = -\frac{1}{2}x^3 \)

12. Let \( f(x) = x^2 - 1 \) and \( g(x) = x + 3 \). Find the following functions and state their domains.
   a. \( f + g \)
   b. \( f - g \)
   c. \( f \cdot g \)
   d. \( \frac{f}{g} \)
   e. \( (f \circ g)(x) \)

13. Let \( f(x) = 2x + 1 \) and \( g(x) = 3x^2 \). Evaluate each of the following.
   a. \( (f + g)(-1) \)
   b. \( (f \cdot g)(2) \)
   c. \( (f \circ g)(2) \)

14. Let \( f(x) = \sqrt{x} \) and \( g(x) = x - 2 \). Find the following functions and state their domains.
   a. \( f \circ g \)
   b. \( g \circ f \)
15. Determine whether the following functions are one-to-one. It may be helpful to sketch the graph.
   a. \( f(x) = x^2 + 1 \)
   b. \( f(x) = x^3 \)
   c. \( f(x) = |x| \)

16. Each equation defines a one-to-one function. Determine \( f^{-1} \). Then verify that \( f \circ f^{-1} \) and \( f^{-1} \circ f \) are both the identity function.
   a. \( f(x) = 3x - 1 \)
   b. \( f(x) = \frac{5}{\sqrt{x}} + 4 \)
   c. \( f(x) = \frac{1}{x-2} \)

**Chapter 2 Review Answers**

1. x-intercept: (3,0) and y-intercept: (0,-2)
2. Graph each equation:

   ![Graph of Problem 1a](image)
   ![Graph of Problem 1b](image)
   ![Graph of Problem 2](image)

3. 26
4. (1,-6)
5. 12.5 years
6. slope:
   a. undefined
   b. \(-\frac{1}{4}\)
   c. 0
7. $5250 per year
8. slope-intercept form:
   a. \( y = -3x + 14 \)
   b. \( y = -4x + 16 \)
   c. \( y = \sqrt{2}x + \frac{2}{3} \)
   d. \( y = -3x - 15 \)
   e. \( y = \frac{3}{4}x - \frac{23}{4} \)

9. Slope: \(-\frac{2}{3}\) and y-intercept: (0,6)

10. Determine whether the lines are parallel, perpendicular, or neither.
    a. perpendicular
    b. Neither
11. Hint: Use (0,555) and (5,80)
   a. $y = -95x + 555$
   b. $270$

12. (i) the intercepts and (ii) any symmetries.
   a. (i) x-intercepts: (-3,0), (0,0), (3,0); y-intercept: (0,0) (ii) origin
   b. (i) x-intercepts: (-1,0), (1,0); y-intercept: (0,1) (ii) y-axis
   c. (i) x-intercept: (0,0) ; y-intercept: (0,0) (ii) x-axis, y-axis, and origin

13. $(x-1)^2 + (y-3)^2 = 5$ (Hint: use midpoint and distance formulas to get center: (1,3) and $r = \sqrt{5}$)

Chapter 3 Review Answers
1. Use interval notation.
   a. $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$
   b. $\left[ -\frac{1}{2}, \infty \right)$

2. Vertical Line Test

3. Function notation
   a. $C(h) = 45h + 60$
   b. $195$
   c. 6 hours

4. $f(x) = -x^2 + 2x$
   a) Vertex (hint: $x = \frac{-b}{2a}$): (1,1)
   b) Axis of Symmetry (hint: $x = \frac{-b}{2a}$):
      $x = 1$
   c) Opens UP/DOWN; MIN/MAX
   d) $y$-intercept: (0,0)
   e) $x$-intercept(s): (0,0) and (0,0)
   f) Domain: $(-\infty, \infty)$
   g) Range: $(-\infty, 1]$  

5. $y = 2(x+1)^2 + 3$
   a) Vertex: (-1,3)
   b) Axis of Symmetry: $x = -1$
   c) Opens UP/DOWN; MIN/MAX
   d) $y$-intercept: (0,5)
   e) $x$-intercept(s): none
   f) Domain: $(-\infty, \infty)$
   g) Range: $[3, \infty)$
6. \( A(t) = 10t + 66 \)
7. \( R(t) = p(2400 - p) \)
   a. $1200
   b. $1,440,000
8. For each of the following functions:
   a. \( f(x) = -x^3 + 3x^2 \)
      i. none
      ii. x-int: (0,0) and (3,0); y-int: (0,0)
      iii. neither
   b. \( f(x) = x^4 - 5x^3 + 4 \)
      i. y-axis
      ii. x-int: (-2,0), (-1,0), (1,0) and (2,0); y-int: (0,4)
   c. \( f(x) = \sqrt{x} \)
      i. \( f(-x) = \sqrt{-x} \)
      ii. \( f(x) = \sqrt{x} \)
      iii. \( f(2x) = \sqrt{2}x \)
      iv. even
9. Increasing: \((1, \infty)\)
   decreasing: \((-4, -3)\)
   constant: \((-3, 1)\)
10. \( f(x) = \begin{cases} 
          |x|, & x < 0 \\
          x + 2, & x \geq 0 
        \end{cases} \)
    a. \( f(-2) = 2, \ f(0) = 2, \ \text{and} \ f(2) = 4 \)
    b. Graph:
11. Graph each of the following functions using a combination of translations, stretching and shrinking, and reflections of the toolkit functions. State the transformations used. Plot at least 3 points for each.
    a. Translate \( y = |x| \) 3 units to the left, reflected over x-axis, vertically stretched by 2.
    b. Translate \( y = x^2 \) 1 unit to the right and 4 units up.
    c. Reflect \( y = \sqrt{x} \) over the y-axis and translate up 3 units.
    d. Reflect \( y = x^3 \) over the x-axis and vertically shrink by 0.5.
12. Let \( f(x) = x^2 - 1 \) and \( g(x) = x + 3 \). Find the following functions and state their domains.
    a. \( (f + g)(x) = x^2 + x + 2; \ (-\infty, \infty) \)
    b. \( (f - g)(x) = x^2 - x - 4; \ (-\infty, \infty) \)
    c. \( (f \cdot g)(x) = x^2 + 3x^2 - x - 3; \ (-\infty, \infty) \)
    d. \( \left( \frac{f}{g} \right)(x) = \frac{x^2 - 1}{x + 3}; \ (-\infty, -3) \cup (-3, \infty) \)
    e. \( (f \circ g)(x) = (x + 3)^2 - 1 = x^2 + 6x + 8; \ (-\infty, \infty) \)
13. Let \( f(x) = 2x + 1 \) and \( g(x) = 3x^2 \). Evaluate each of the following.
    a. \((f + g)(-1) = 2\)
    b. \((f \cdot g)(2) = 60\)
c. \((f \circ g)(2) = 25\)

14. Let \(f(x) = \sqrt{x}\) and \(g(x) = x - 2\). Find the following functions and state their domains.
   a. \((f \circ g)(x) = \sqrt{x - 2}; \{x | x \geq 2\}\)
   b. \((g \circ f)(x) = \sqrt{x - 2}; \{x | x \geq 0\}\)

15. Determine whether the following functions are one-to-one.
   a. \(f(x) = x^2 + 1\) NOT 1-1
   b. \(f(x) = x^3\) 1-1
   c. \(f(x) = |x|\) NOT 1-1

16. Each equation defines a one-to-one function. Determine \(f^{-1}\). Then verify that \(f \circ f^{-1}\) and \(f^{-1} \circ f\) are both the identity function.
   a. \(f(x) = 3x - 1\) \(f^{-1}(x) = \frac{x + 1}{3}\) \(\text{OR} f^{-1}(x) = \frac{1}{3}x + \frac{1}{3}\)
   b. \(f(x) = \sqrt[5]{x} + 4\) \(f^{-1}(x) = (x - 4)^5\)
   c. \(f(x) = \frac{1}{x - 2}\) \(f^{-1}(x) = \frac{1}{x} + 2\) \(\text{OR} f^{-1}(x) = \frac{1 + 2x}{x}\)