ASSIGNMENT 6

DYLAN ZWICK'S MATH 1010 CLASS

3.7 GRAPHS OF FUNCTIONS

Sketch the graph of the function. Then determine its domain and range.

3.7.1: $f(x) = 2x - 7$ **3.7.11:** $f(t) = \sqrt{t - 2}$

3.7.5: $f(x) = -(x - 1)^2$ **3.7.14:** $H(x) = -4$

3.7.7: $h(x) = x^2 - 6x + 8$

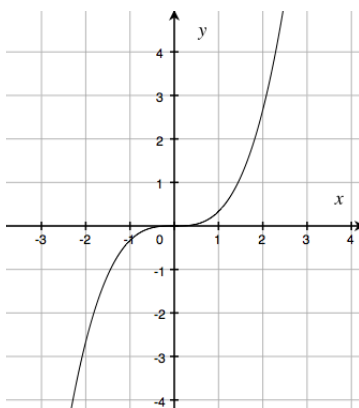**3.7.22:** $f(x) = \dfrac{1}{3}x - 2, \quad 6 \le x \le 12$

3.7.25: $h(x) = \begin{cases} 2x + 3, & x < 0 \\ 3 - x, & x \ge 0 \end{cases}$

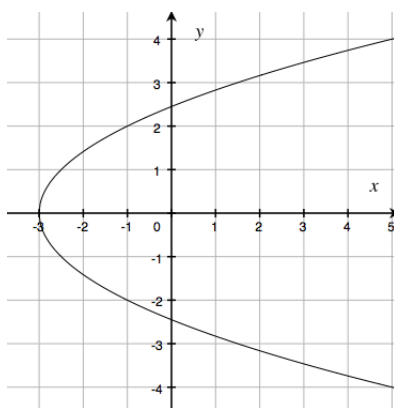Sketch a graph of the equation.Use the Vertical Line Test to determine whether y is function of x.

3.7.40: $y = x^2 + 2$

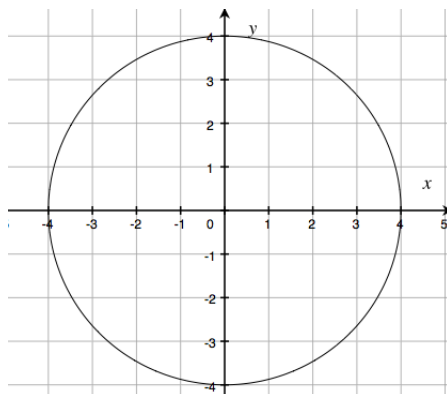Use the Vertical Line Test to determine whether y is a function of x.

3.7.33: $y = \dfrac{1}{3}x^3$

3.7.36: $-2x + y^2 = 6$

3.7.37: $x^2 + y^2 = 16$

Identify the transformation of f, and sketch a graph of the function h.

3.7.47: $f(x) = x^2$

(a) $h(x) = x^2 + 2$ (d) $h(x) = (x - 4)^2$
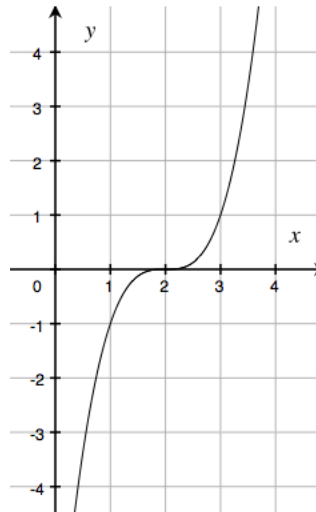
(b) $h(x) = x^2 - 4$ (e) $h(x) = (x - 3)^2 + 1$

(c) $h(x) = (x + 2)^2$ (f) $h(x) = -x^2 + 4$

3.7.69: Identify the basic function and any transformation shown in the graph. Write the equation for the graphed fuction.

3.7.82: *Graphical Reasoning* An electronically controlled thermostat in a home is programmed to lower the temperature automatically during the night. The temperature T, in degrees Fahrenheit, is given in terms of t, the time on a 24-hour clock(see figure).

Time on a 24–hour clock
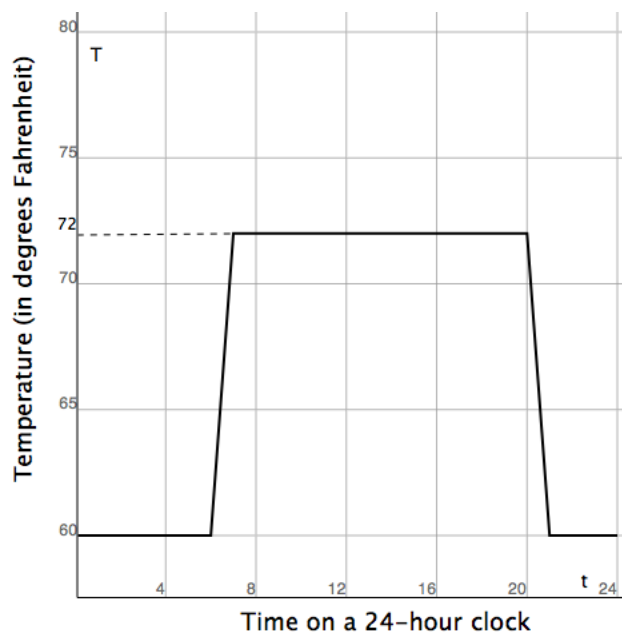
(a) Explain why T is function of t.

(b) Find $T(4)$ and $T(15)$.

(c) The thermostat is reprogrammed to produce a temperature H, where $H(t) = T(t-1)$. Explain how this changes the temperature in the house.

(d) The thermostat is reprogrammed to produce a temperature H, where $H(t) = T(t) - 1$. Explain how this changes the temperature in the house.

4.1 SYSTEMS OF EQUATIONS

Determine whether each ordered pair is a solution of the system of equations.

4.1.1: $\begin{cases} x + 2y & = 9 \\ -2x + 3y & = 10 \end{cases}$

(a) $(1, 4)$

(b) $(3, -1)$

4.1.2: $\begin{cases} 5x - 4y & = 34 \\ x - 2y & = 8 \end{cases}$

(a) $(0, 3)$

(b) $(6, -1)$

4.1.5: $\begin{cases} 4x - 5y & = 12 \\ 3x + 2y & = -2.5 \end{cases}$

(a) $(8, 4)$

(b) $(\frac{1}{2}, -2)$

State the number of solutions of the system of linear equations without solving the system.

4.1.9: $\begin{cases} y & = 4x \\ y & = 4x + 1 \end{cases}$

4.1.10: $\begin{cases} y & = 3x + 2 \\ y & = -3x + 2 \end{cases}$

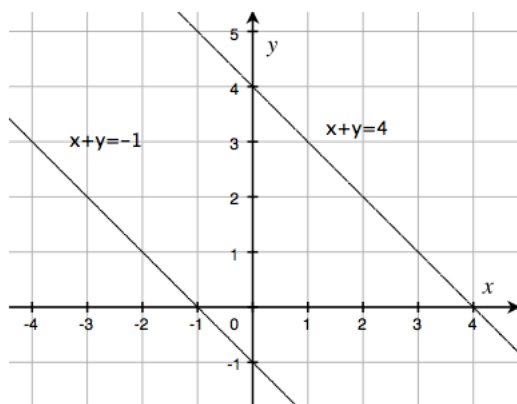**4.1.14:** $\begin{cases} y & = \frac{2}{3}x + 1 \\ 3y & = 2x + 3 \end{cases}$

Determine whether the system is consistent or inconsistent.

4.1.15: $\begin{cases} x + 2y & = 6 \\ x + 2y & = 3 \end{cases}$
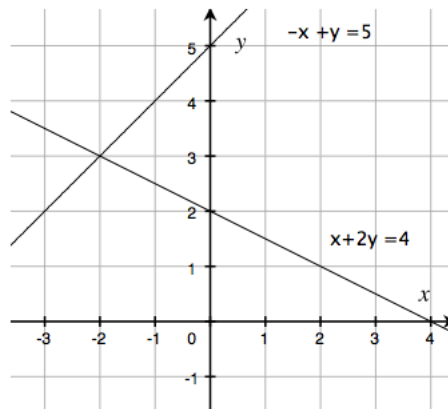
4.1.19: $\begin{cases} -x + 4y & = 7 \\ 3x - 12y & = -21 \end{cases}$

Use the graphs of the equations to determine whether the system has any solutions. Find any solutions that exist.

4.1.27: $\begin{cases} x + y & = 4 \\ x + y & = -1 \end{cases}$ **4.1.28:** $\begin{cases} -x + y & = 5 \\ x + 2y & = 4 \end{cases}$

Use the graphical method to solve the system of equations.

4.1.35: $\begin{cases} y & = -x + 3 \\ y & = x + 1 \end{cases}$ **4.1.48:** $\begin{cases} 7x + 4y & = 6 \\ 5x - 3y & = -25 \end{cases}$

4.1.40: $\begin{cases} 5x + 2y & = 24 \\ y & = 2 \end{cases}$

Solve the system of equations by the method of substitution.

4.1.53: $\begin{cases} x - 2y & = 0 \\ 3x + 2y & = 8 \end{cases}$

4.1.66: $\begin{cases} x + 4y & = 300 \\ x - 2y & = 0 \end{cases}$

4.1.57: $\begin{cases} x + y & = 3 \\ 2x - y & = 0 \end{cases}$

4.1.69: $\begin{cases} 4x - 14y & = -15 \\ 18x - 12y & = 9 \end{cases}$

4.1.61: $\begin{cases} 3x + y & = 8 \\ 3x + y & = 6 \end{cases}$

4.1.72: $\begin{cases} \dfrac{1}{2}x + \dfrac{3}{4}y & = 10 \\ \\ \dfrac{3}{2}x - y & = 4 \end{cases}$

4.1.95: ***Hay Mixture*** A farmer wants to mix two types of hay. The first type sells for $ 125 per ton and the second type sells for $75 per ton. The farmer wants a total of 100 tons of hay at a cost of $90 per ton. How many tons of each type of hay should be used in the mixture?

4.1.97: *Break-Even Analysis* A small business invests $8000 in equipment to produce a new candy bar. Each bar costs $1.20 to produce and is sold for $2.00. How many candy bars must be sold before the business breaks even?

4.1.101: *Investment* A total of $ 12,000 is invested in two bonds that pay 8.5% and 10% simple interest. The annual interest is $1140. How much is invested in each bond?

Number Problems Find two positive integers that satisfy the given requirements.

**4.1.103:** The sum of the two numbers is 80 and their difference is 18.

4.1.110: The difference of the numbers is 86 and the larger number is three times the smaller number.

4.2 Linear Systems in Two Variables

Solve the system of linear equations by the method of elimination. Identify and label each line with its equation, and label the point of intersection(if any).

4.2.1: $\begin{cases} 2x + y &= 4 \\ x - y &= 2 \end{cases}$ **4.2.5:** $\begin{cases} 3x + y &= 3 \\ 2x - y &= 7 \end{cases}$
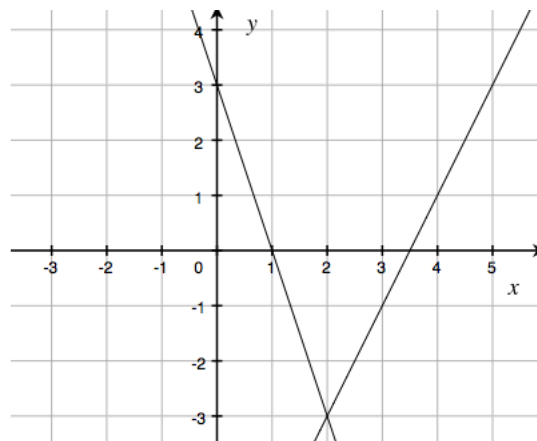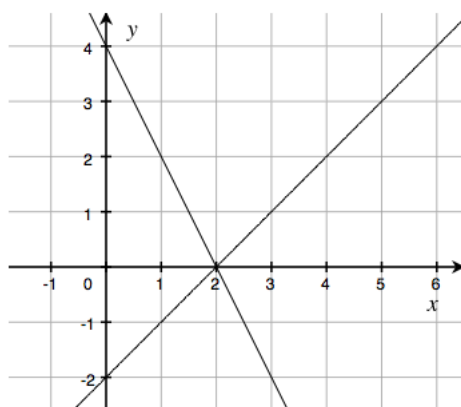
Solve the system of linear equations by the method of elimination.

4.2.13: $\begin{cases} 6x - 6y &= 25 \\ 3y &= 11 \end{cases}$ **4.2.19:** $\begin{cases} 5x + 2y = 7 \\ 3x - y = 13 \end{cases}$

4.2.21: $\begin{cases} x - 3y = 2 \\ 3x - 7y = 4 \end{cases}$
                    4.2.35: $\begin{cases} 5x + 7y = 25 \\ x + 1.4y = 5 \end{cases}$

4.2.25: $\begin{cases} 2u + 3v = 8 \\ 3u + 4v = 13 \end{cases}$

4.2.37: $\begin{cases} \dfrac{1}{2}x - \dfrac{1}{3}y = 1 \\ \dfrac{1}{4}x - \dfrac{1}{9}y = \dfrac{2}{3} \end{cases}$

4.2.27: $\begin{cases} 12x - 5y = 2 \\ -24x + 10y = 6 \end{cases}$

Solve the system of linear equations by any convenient method.

4.2.41: $\begin{cases} x + 7y & = -6 \\ x - 5y & = 18 \end{cases}$
    4.2.45: $\begin{cases} 2x - y & = 20 \\ -x + y & = -5 \end{cases}$

Decide whether the system is consistent or inconsistent.

4.2.49: $\begin{cases} 4x - 5y & = 3 \\ -8x + 10y & = -6 \end{cases}$

4.2.61: ***Break-Even Analysis*** To open a small business, you need an initial investment of $85,000. Your costs each week will be about $7400. Your projected weekly revenue is $8300. How many weeks will it take to break even?

4.2.63: ***Comparing costs*** A band charges $500 to play for 4 hours plus $50 for each additional hour. A DJ costs $300 to play for 4 hours plus $75 for each additional hour. After how many hours will the cost of the DJ exceed the cost of the band?

4.2.67: ***Average Speed*** A van travels for 2 hours at an average speed of 40 miles per hour. How much longer must the van travel at an average speed of 55 miles per hour so that the average speed for the total trip will be 50 miles per hour?

4.2.71: ***Ticket Sales*** Five hundred tickets were sold for a fundraising dinner. The receipts totaled $3400.00. Adult tickets were$7.50 each and children's tickets were $4.00 each. How many tickets of each type were sold?

4.2.80: ***Acid Mixture*** Fifty gallons of a 60% acid solution is obtained by mixing an 80% solution with a 50% solution. How many gallons of each solution must be used to obtain the desired mixture?

4.2.83: ***Best-Fitting Line*** The slope and y-intercept of the line $y = mx + b$ that best fits the three noncollinear points $(0,0), (1,1), (2,3)$ are given by the solution of the following system of linear equations.

$$\begin{cases} 5m + 3b & = 7 \\ 3m + 3b & = 4 \end{cases}$$

(a) Solve the system and find the equation of the best-fitting line.

(b) Plot the three points and sketch the graph of the best fitting line.