1) For each polynomial: state the number of terms, the degree of the polynomial, and the leading term (leading coefficient).

a) $5x^2 - x^3 + 2 - 7x$

b) $2n + 3n^3 + n^4 - 5n^2 - 3$

2) Combine 'like' terms: $3xy + 2x^2y - 5x + 6xy - xy^2 + 10x - 9xy^2 + 4x^2y$

3) Add or subtract the polynomials.

a) $(3a^2 - 5 + 2a) - (7a - a^2 - 9) - (-3a + 12 - 4a)$

b) Add:
$$\begin{array}{r} 3n^3 + 7n^2 - 4n + 1 \\ 2n^3 - 4n^2 \quad\quad - 9 \\ \underline{-3n^3 + 9n^2 - n + 13} \end{array}$$

c) $\left(\frac{3}{4}a + \frac{4}{5}\right) - \left(\frac{2}{3}a - \frac{3}{2}\right) - \left(\frac{5}{6} - a\right)$

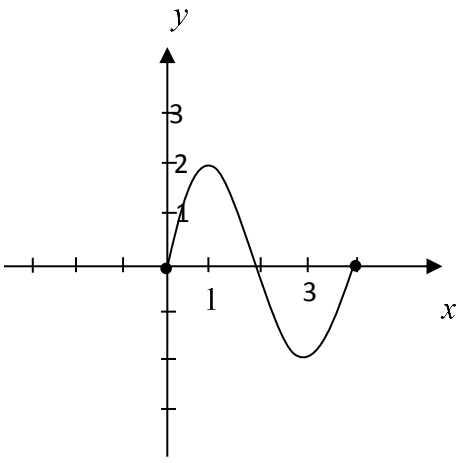
4) Simplify: $3(2r + 9) - 4(8 - 3r) + 5(3r) - 18(r - 1)$

5) Identify which of the following (*a* – *f*) are functions. Identify the domain and range for each.

a)

x	-3	-1	0	1	2	3	3	5	9
y	2	2	1	8	-6	0	5	4	10

b)



c) $y = |3x + 6|$

d) $b = \sqrt{a - 5}$

e) $y = \dfrac{x}{x - 2}$

f) $x = y^2$

6) Given the three functions below, find the following function values if they exist (are real numbers).

$$f(x)=x^2-x+1 \qquad g(x)=\sqrt{2x+3} \qquad h(x)=\frac{2x+5}{3x-1}$$

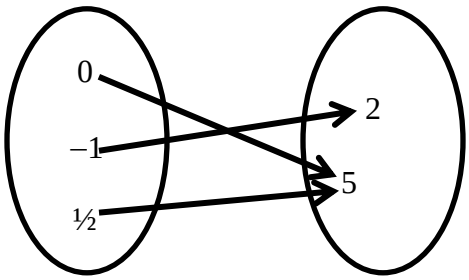
a) $f(3)$ *b*) $g(-1)$ *c*) $h(3a-2)$

d) $f(-15)$ *e*) $g(3)$ *f*) $h\left(\frac{1}{3}\right)$

7) Given $F(t)=-2t+\pi$, find the following.

a) $F(3\pi)$ *b*) $F(h-4\pi)$

8) At the right is a function *g*.



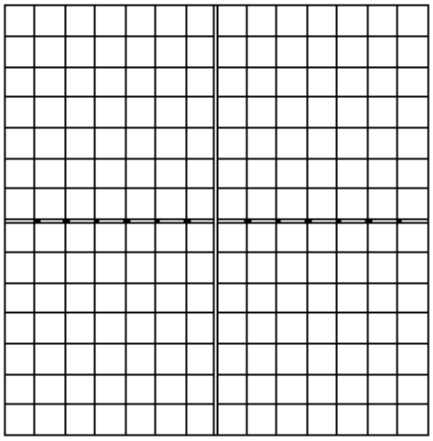
Find the following information.

a) $g(-1)$ *b*) $g(x)=2,$ what is x?

c) $g\left(\frac{1}{2}\right)$

9) Sketch the following linear functions.
Use a scale of 1 unit per hash mark on both axes.

a) $f(x)=\frac{1}{2}x+4$ *b*) $g(x)=-x-1$



10) The function $H(x)=2.75x+71.48$ can be used to predict the height, in centimeters, of a woman whose humerus (the bone from the elbow to the shoulder) is x centimeters long. Predict the height of a woman whose humerus is a length of 34 cm.

Find each product.

11) $3y^2(2y^4-4y^3+9y^2-7y-6)$ 12) $(4a-9)(3a+4)$

13) $5x(6x-5)(3x-2)$

14) $(4n+3)(3n^2-n+2)$

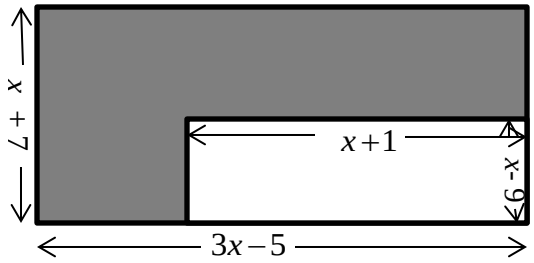
15) Multiply:

$$\begin{array}{r} 4x^2-2x+3 \\ \underline{\qquad 6x-5} \end{array}$$

16) Find each product. *a*) $(6x-\frac{1}{2})(6x+\frac{1}{2})$ *b*) $(12x-5)^2$

17) Find this product: $(4x+3)(2x-1)(x+4)$

18) Find the area shaded in gray below (as a polynomial).



19) A rectangular box has length $2x-4$, width $x+6$, and height $x+11$. Find the volume of the box (as a polynomial) if the length and width are both increased by 3 units and the height is decreased by 4 units.

Solve each equation.

20) $5(2x-3)-4(x+9)=-(x+12)+9$

21) $\frac{4}{5}x-2=3+\frac{2x-9}{2}$

22) $\frac{21}{16}-\frac{48}{2x-4}=\frac{9}{8}$

23) $\frac{2}{x+5}+\frac{1}{x-5}=\frac{16}{x^2-25}$

24) $\frac{3}{4}-\frac{1}{x}=\frac{7}{8x}$

25) $\frac{4}{t^2+t-12}=\frac{1}{t+4}-\frac{2}{t-3}$

26) $2x-5x+9=5-3(x-4)$

Write an equation for each applied problem. Solve the equation and state the answer to the problem.

27) A mother wants to invest \$6000 for her daughter's future wedding. She invests part of the money in a bank certificate of deposit which earns 4% and the remainder of the

money in a bond that earns 7%. In the first year, both investments yielded a total of $360 interest. How much money was invested in the bond?

28) A pharmacist wishes to mix a solution that is 4% Minoxidil. He has on hand 80 mL of a 3% Minoxidil solution and will add an unknown amount of a 6% Minoxidil solution to obtain the desired 4% solution. How much of the 6% Minoxidil solution should he add?

29) A truck enters an interstate highway driving 60 miles per hour. A car enters at the same location 13 minutes later and drives 74 miles per hour following the truck's route. How long has the car been on the interstate highway before it will pass the truck?

30) Dr. Smith can ride his bike to his office and averages 7.5 miles per hour. If he drives his car, he averages 30 miles per hour. By car, the trip is 12 minutes less time than biking. How far is Dr. Smith's office from his home?

31) Jean can wax her car in 2 hours time. When Helen helps her, they can wax the car in ½ hour. How long would it take Helen alone to wax Jean's car?

Solve each equation.

32) $6x^2 - 11x - 10 = 0$

33) $x^2 - 5x + 3 = 0$

34) $\dfrac{5x}{x-2} + \dfrac{3}{x} + 2 = \dfrac{-6}{x^2 - 2x}$

35) $3x^2 + 5x + 1 = 0$

36) A rectangular plot of ground having dimensions 26 feet by 30 feet is surrounded by a walkway of uniform width. If the total area of the plot and the walkway is 1020 square feet, find the width of the walkway.

37) A 13 foot long ladder is leaning against a house on level ground. The distance from the bottom of the ladder to the house along the ground is 7 feet less than the distance from the top of the ladder to the ground. How far is the bottom of the ladder from the house?

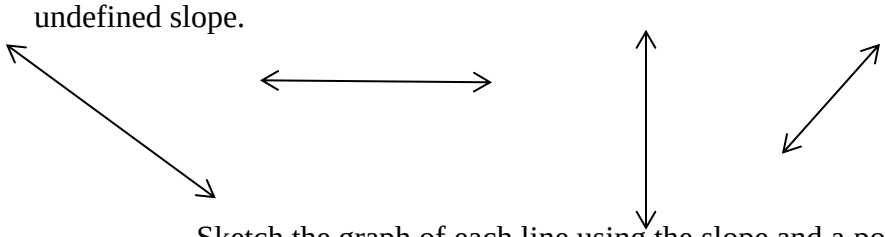
38) A cleaning service provides two people to clean an office building. Working together, the two can clean the building in 5 hours. One person, new to the job, would take 2 hours longer than the other person to clean the building alone. How long (to the nearest tenth of an hour) would it take the newer worker to clean the building alone?

39) (a) Find the slope of a line through each pair of points. (b) Find the equation of each line in standard form.

A (5,8) and (–3,–1) *B* $\left(\frac{3}{2}, 2\right)$ and $\left(-\frac{7}{2}, -5\right)$

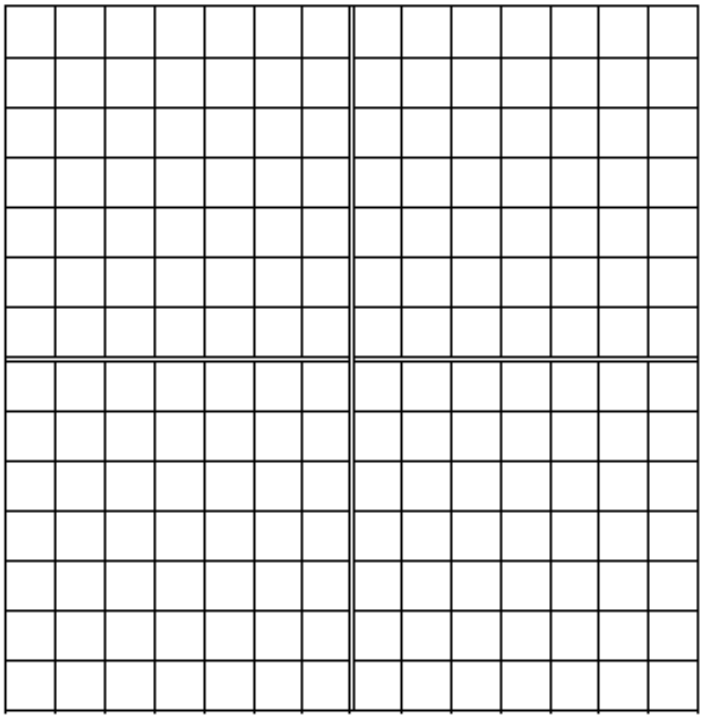
40) Find the equations of a vertical line and a horizontal line through the point (-5, 3).

41) Identify which line has (a) positive slope, (b) negative slope, (c) zero slope, and (d) undefined slope.



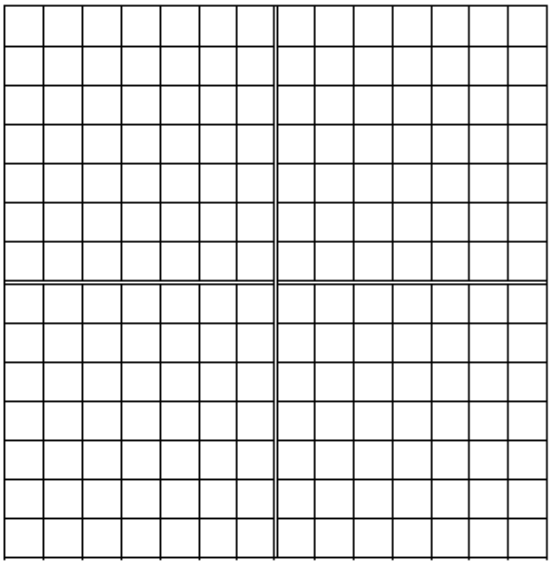
42) Sketch the graph of each line using the slope and a point.

(*a*) $y = -\frac{3}{4}x + 2$ (*b*) $3x - 5y = -15$



43) Find the *x*-intercept and *y*-intercept of the line and use the intercepts to graph the line.

$2x-4y=8$



45) Find the equation of a line with an *x*-intercept of (3, 0) and a *y*-intercept of (0, 2). Write your answer in standard form.

46) Find the equation in slope-intercept form for a line through (-1,6) with a slope of $-\frac{5}{6}$.

47) An athletic club offers a family membership of $165 plus $60 for each additional family member after the first. Let *x* represent the number of additional family members. Write a linear equation in slope-intercept form to represent the membership fee. Use your equation to find the membership fee for a four-person family.

48) In the year 2000 (year 0), the percent of households that had access to high-speed broadband internet service was 9%. By the year 2005 (year 5), the percent of households that had access to high-speed broadband internet service had grown to 37%. This percent has been growing in a linear pattern. (a) Use this information to write 2 ordered pairs and find the slope. (b) Find an equation for the percent in terms of number of years since 2000 (in slope-intercept form). (c) Use your equation to predict what percent of households had high-speed broadband in the year 2010.

49) Complete the table below, then use it to approximate $\lim_{x\to -1} f(x)$, where $f(x)=\dfrac{2x^3+3x^2-4x-5}{x+1}$.

x	-1.1	-1.01	-1.001	-0.999	-0.99	-0.9
f(x)						

50) Find the limit values if they exist.

a) $\lim_{x\to 3}\left(\dfrac{x^2+2x-15}{x^2+x-12}\right)$

b) $\lim_{z\to 0}\left(\dfrac{\dfrac{-1}{z+2}+\dfrac{1}{2}}{z}\right)$

c) $\lim_{x\to 16}\left(\dfrac{\sqrt{x}-4}{x-16}\right)$

d) $\lim_{x\to \infty}\left(\dfrac{2x^3-5x^2+9x}{3x^3-4x}\right)$

e) $\lim_{x\to -\infty}\left(\dfrac{2x^2-5}{3x^3+2x}\right)$