Section 4.1: Linear functions and their properties

1 – 10: Find the following:

a) slope
b) y-intercept
c) x-intercept (if any)
d) sketch a graph
e) Determine the interval(s) where the graph is increasing, decreasing or constant.

1) f(x) = 3x – 6

2) f(x) = 2x – 10

3) g(x) = -2x – 8

4) g(x) = -4x – 8

5) f(x) = 7

6) f(x) = - 2

7) $g(x) = \frac{2}{3}x - 4$

8) $g(x) = \frac{3}{4}x - 6$

9) $f(x) = \frac{-x}{4} + 2$

10) f(x) = $\frac{-x}{3} + 1$

11) Suppose f(x) = 3x – 6 and g(x) = - 2x + 4

a) Solve f(x) = 0
b) Solve f(x) > 0
c) Solve f(x) = g(x)
d) Solve f(x) < g(x)

12) Suppose f(x) = -3x – 2 and g(x) = -2x + 8

a) Solve f(x) = 0
b) Solve f(x) > 0
c) Solve f(x) = g(x)
d) Solve f(x) < g(x)

13) Suppose f(x) = x-3 and g(x) = 2x + 4

a) Solve f(x) = 0
b) Solve f(x) > 0
c) Solve f(x) = g(x)
d) Solve f(x) < g(x)

14) Suppose f(x) = 3x – 6 and g(x) = 4x + 4

a) Solve f(x) = 0
b) Solve f(x) > 0
c) Solve f(x) = g(x)
d) Solve f(x) < g(x)

#15-20:

a) Create a scatter plot of the data.
b) Determine whether the given function is linear or nonlinear.
c) If the function is linear, determine the equation of the line. (Write your answer using function notation)

15)

x	y = f(x)
1	2
2	4
3	6
4	8
5	10
6	12

16)

x	y = f(x)
1	3
2	6
3	9
4	12
5	15
6	18

17)

x	y = f(x)
1	1
2	4
3	9
4	16
5	25

18)

x	y = f(x)
1	1
2	8
3	27
4	64

19)

x	y = f(x)
1	20
2	15
3	10
4	5
5	0
6	-5
7	-10

20)

x	y = f(x)
1	30
2	20
3	10
4	0
5	-10
6	-20
7	-30

21) Suppose that the number of a units of a certain product that will be supplied (S) at price (p) (in dollars) is given by the equation:

$$S(p) = 2p - 10$$

Suppose that number of units of the same product that will be demanded (D) at price (p) (in dollars) is given by the equation:

$$D(p) = -2p + 20$$

a) How many units of the product will be supplied at a price of $8?
b) How many units of the product will be demanded at a price of $8?
c) At a price of $8 does the supply exceed demand, or does demand exceed supply?
d) Find the equilibrium price.
e) How many units of the product will be supplied at the equilibrium price?
f) How many units of the product will be demanded at the equilibrium price?

22) Suppose that the number of a units of a certain product that will be supplied (S) at price (p) (in dollars) is given by the equation:

$$S(p) = 3p - 2$$

Suppose that number of units of the same product that will be demanded (D) at price (p) (in dollars) is given by the equation:

$$D(p) = -4p + 12$$

a) How many units of the product will be supplied at a price of $1?
b) How many units of the product will be demanded at a price of $1?
c) At a price of $1 does the supply exceed demand, or does demand exceed supply?
d) Find the equilibrium price.
e) How many units of the product will be supplied at the equilibrium price?
f) How many units of the product will be demanded at the equilibrium price?

23) Suppose that the number of a units of a certain product that will be supplied (S) at price (p) (in dollars) is given by the equation:

$$S(p) = 5p - 40$$

Suppose that number of units of the same product that will be demanded (D) at price (p) (in dollars) is given by the equation:

$$D(p) = -3p + 40$$

a) How many units of the product will be supplied at a price of $9?
b) How many units of the product will be demanded at a price of $9?
c) At a price of $9 does the supply exceed demand, or does demand exceed supply?
d) Find the equilibrium price.
e) How many units of the product will be supplied at the equilibrium price?
f) How many units of the product will be demanded at the equilibrium price?

24) Suppose that the number of a units of a certain product that will be supplied (S) at price (p) (in dollars) is given by the equation:

$$S(p) = 5p - 12$$

Suppose that number of units of the same product that will be demanded (D) at price (p) (in dollars) is given by the equation:

$$D(p) = -2p + 16$$

a) How many units of the product will be supplied at a price of $3?
b) How many units of the product will be demanded at a price of $3?
c) At a price of $3 does the supply exceed demand, or does demand exceed supply?
d) Find the equilibrium price.
e) How many units of the product will be supplied at the equilibrium price?
f) How many units of the product will be demanded at the equilibrium price?

25) A company makes a single product. The monthly cost (C) to make x units of the product can be found using the cost equation:

$$C(x) = 3x + 100$$

The monthly revenue (R) earned from selling x units of the product can be found using the revenue equation:

$$R(x) = 8x$$

a) Find the cost of making 30 units of the product during a month.
b) Find the monthly revenue earned by selling 30 units of the product.
c) Is there a profit or loss when 30 units of the product are produced and sold in a month?
d) What is the amount of the profit or loss?
e) Find the break-even quantity.
f) What is the monthly cost at the break-even quantity?
g) What is the monthly revenue at the break-even quantity?
h) What is the monthly profit at the break-even quantity?

26) A company makes a single product. The monthly cost (C) to make x units of the product can be found using the cost equation:

$C(x) = 2x + 150$

The monthly revenue (R) earned from selling x units of the product can be found using the revenue equation:
$R(x) = 4x$

a) Find the cost of making 40 units of the product during a month.
b) Find the monthly revenue earned by selling 40 units of the product.
c) Is there a profit or loss when 40 units of the product are produced and sold in a month?
d) What is the amount of the profit or loss?
e) Find the break-even quantity.
f) What is the monthly cost at the break-even quantity?
g) What is the monthly revenue at the break-even quantity?
h) What is the monthly profit at the break-even quantity?

27) A company makes a single product. The monthly cost (C) to make x units of the product can be found using the cost equation:

$C(x) = 5x + 400$

The monthly revenue (R) earned from selling x units of the product can be found using the revenue equation:
$R(x) = 7x$

a) Find the cost of making 100 units of the product during a month.
b) Find the monthly revenue earned by selling 100 units of the product.
c) Is there a profit or loss when 1000 units of the product are produced and sold in a month?
d) What is the amount of the profit or loss?
e) Find the break-even quantity.
f) What is the monthly cost at the break-even quantity?
g) What is the monthly revenue at the break-even quantity?
h) What is the monthly profit at the break-even quantity?

28) A company makes a single product. The monthly cost (C) to make x units of the product can be found using the cost equation:

$C(x) = 4x + 300$

The monthly revenue (R) earned from selling x units of the product can be found using the revenue equation:

$R(x) = 10x$

a) Find the cost of making 60 units of the product during a month.
b) Find the monthly revenue earned by selling 60 units of the product.
c) Is there a profit or loss when 60 units of the product are produced and sold in a month?
d) What is the amount of the profit or loss?
e) Find the break-even quantity.
f) What is the monthly cost at the break-even quantity?
g) What is the monthly revenue at the break-even quantity?
h) What is the monthly profit at the break-even quantity?

29) U-Haul charges $25 per day plus 25 cents for each mile driven to rent a certain truck.

a) Create a linear function the models the cost of renting a truck for one day when "m" miles are driven.

b) What is the cost of renting the truck for one day if it is driven 100 miles?

c) Suppose the cost of renting a truck for 1 day is $75. How many miles were driven?

30) U-Haul charges $30 per day plus 75 cents for each mile driven to rent a certain truck.

a) Create a linear function the models the cost of renting a truck for one day when "m" miles are driven.

b) What is the cost of renting the truck for one day if it is driven 200 miles?

c) Suppose the cost of renting a truck for 1 day is $105. How many miles were driven?

31) U-Haul charges $20 per day plus 50 cents for each mile driven to rent a certain truck.

a) Create a linear function the models the cost of renting a truck for one day when "m" miles are driven.

b) What is the cost of renting the truck for one day if it is driven 80 miles?

c) Suppose the cost of renting a truck for 1 day is $35. How many miles were driven?

32) U-Haul charges $40 per day plus 70 cents for each mile driven to rent a certain truck.

a) Create a linear function the models the cost of renting a truck for one day when "m" miles are driven.

b) What is the cost of renting the truck for one day if it is driven 100 miles?

c) Suppose the cost of renting a truck for 1 day is $75. How many miles were driven?