Student: _____ **Instructor:** Alice Snow **Assignment:** HW 2.1 and 2.2
Date: _____ **Course:** Precalculus 2022: Snow

1. Write the following inequality in interval notation.

$-9 < x < -7$

In interval notation, $-9 < x < -7$ is written as [ ].

2. Complete the sentence below.

If f is a function defined by the equation $y = f(x)$, then x is called the _____ variable and y is the _____ variable.

If f is a function defined by the equation $y = f(x)$, then x is called the (1) _____ variable and y is the (2) _____ variable.

(1) ○ dependent ○ independent ○ range ○ output

(2) ○ domain ○ dependent ○ independent ○ input

3. Fill in the blanks.

The domain of $\frac{f}{g}$ consists of numbers x for which $g(x)$ ____ 0 that are in the domains of _____.

The domain of $\frac{f}{g}$ consists of numbers x for which $g(x)$ (1) _____ 0 that are in the domains of (2) _____

(1) ○ = ○ ≠

(2) ○ either f or g. ○ both f and g.

4. Determine whether the following relation represents a function. If the relation is a function, then state its domain and range.

$\{(8,4), (-3,4), (9,8), (8,16)\}$

Does the relation represent a function? Choose the correct answer below.

○ Yes
○ No

State the domain of the function. Choose the correct answer below.

○ **A.** The domain is {[ ]}.
(Use a comma to separate answers as needed.)

○ **B.** The relation is not a function.

State the range of the function. Choose the correct answer below.

○ **A.** The range is {[ ]}.
(Use a comma to separate answers as needed.)

○ **B.** The relation is not a function.

5. Determine whether the equation defines y as a function of x.

$x - 6 = y^2$

Does the equation define y as a function of x?

○ Yes
○ No

6. Determine whether the equation defines y as a function of x.

$y = 5x^2 - 8x + 1$

Does the equation define y as a function of x?

- ○ Yes
- ○ No

7. For the function f defined by $f(x) = 2x^2 + 4x + 3$, find the following values.

(a) $f(-1) =$ ☐ (Simplify your answer.)

(b) $f(-x) =$ ☐ (Simplify your answer.)

(c) $-f(x) =$ ☐ (Simplify your answer.)

(d) $f(x+h) =$ ☐ (Simplify your answer.)

8. Find the domain of the function.

$f(x) = -8x + 6$

The domain is ☐. (Type your answer in interval notation.)

9. Find the domain of the function.

$$g(x) = \frac{5x}{x^2 - 36}$$

The domain is ☐.
(Type your answer in interval notation.)

10. Find the domain of the function.

$f(x) = \sqrt{3x - 24}$

The domain is ☐. (Type your answer in interval notation.)

11. Find the domain of the function.

$$f(x) = \frac{5}{\sqrt{x+4}}$$

The domain is ☐.
(Type your answer in interval notation.)

12. For the given functions f and g, complete parts (a)-(h). For parts (a)-(d), also find the domain.

$f(x) = 2x + 9$; $g(x) = 5x - 6$

(a) Find $(f + g)(x)$.

$(f + g)(x) =$ ☐ (Simplify your answer.)

What is the domain of $f + g$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The domain is $\{x|$ ☐ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

○ **B.** The domain is $\{x|$ x is any real number$\}$.

(b) Find $(f - g)(x)$.

$(f - g)(x) =$ ☐ (Simplify your answer.)

What is the domain of $f - g$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The domain is $\{x|$ ☐ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

○ **B.** The domain is $\{x|$ x is any real number$\}$.

(c) Find $(f \cdot g)(x)$.

$(f \cdot g)(x) =$ ☐ (Simplify your answer.)

What is the domain of $f \cdot g$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The domain is $\{x|$ ☐ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

○ **B.** The domain is $\{x|$ x is any real number$\}$.

(d) Find $\left(\frac{f}{g}\right)(x)$.

$\left(\frac{f}{g}\right)(x) =$ ☐ (Simplify your answer.)

What is the domain of $\frac{f}{g}$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The domain is $\{x|$ ☐ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

○ **B.** The domain is $\{x|$ x is any real number$\}$.

(e) Find $(f + g)(3)$.

$(f + g)(3) =$ ☐ (Type an integer or a simplified fraction.)

(f) Find $(f - g)(4)$.

$(f - g)(4) =$ ☐ (Type an integer or a simplified fraction.)

(g) Find $(f \cdot g)(2)$.

$(f \cdot g)(2) =$ ☐ (Type an integer or a simplified fraction.)

(h) Find $\left(\frac{f}{g}\right)(1)$.

$\left(\frac{f}{g}\right)(1) =$ ☐ (Type an integer or a simplified fraction.)

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13. Find the difference quotient of f; that is, find $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$, for the following function.

$f(x) = 3x + 9$

$\frac{f(x+h)-f(x)}{h} =$ ☐ (Simplify your answer.)

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14. Complete the sentence below.

A set of points in the xy-plane is the graph of a function if and only if every _____ line intersects the graph in at most one point.

A set of points in the xy-plane is the graph of a function if and only if every (1) _____ line intersects the graph in at most one point.

(1) ○ vertical
○ horizontal

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15. Determine whether the statement below is true or false.

The graph of a function $y = f(x)$ always crosses the y-axis.

Choose the correct answer below.

○ True
○ False

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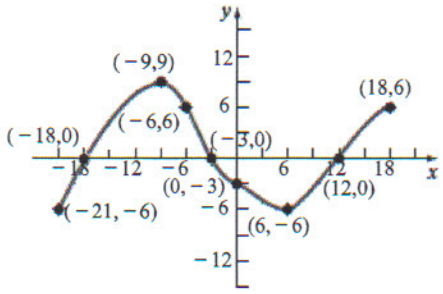
16. Use the given graph of the function f to answer parts (a)-(n).



(a) Find f(−21) and f(6).

f(−21) = ☐

f(6) = ☐

(b) Find f(18) and f(0).

f(18) = ☐

f(0) = ☐

(c) Is f(6) positive or negative?

- ○ Negative
- ○ Positive

(d) Is f(−9) positive or negative?

- ○ Positive
- ○ Negative

(e) For what value(s) of x is f(x) = 0?

x = ☐
(Use a comma to separate answers as needed.)

(f) For what values of x is f(x) > 0?

☐
(Type a compound inequality. Use a comma to separate answers as needed.)

(g) What is the domain of f?

The domain of f is {x| ☐}.
(Type a compound inequality.)

(h) What is the range of f?

The range of f is {y| ☐}.
(Type a compound inequality.)

(i) What are the x-intercept(s)?

x = ☐
(Use a comma to separate answers as needed.)

(j) What are the y-intercept(s)?

y = ☐
(Use a comma to separate answers as needed.)

(k) How often does the line y = 1 intersect the graph?

☐ time(s)

(l) How often does the line x = 3 intersect the graph?

☐ time(s)

(m) For what value(s) of x does f(x) = −6?

x = ☐

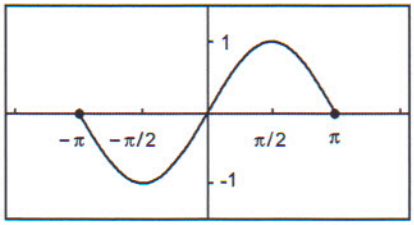
(Use a comma to separate answers as needed.)

(n) For what value(s) of x does f(x) = 9?

x = ☐

(Use a comma to separate answers as needed.)

17. Determine whether the graph below is that of a function by using the vertical-line test. If it is, use the graph to find
(a) its domain and range.
(b) the intercepts, if any.
(c) any symmetry with respect to the x-axis, y-axis, or the origin.



Is the graph that of a function?

- ○ Yes
- ○ No

If the graph is that of a function, what are the domain and range of the function? Select the correct choice below and fill in any answer boxes within your choice.

- ○ **A.** The domain is ☐. The range is ☐.
(Type your answers in interval notation.)
- ○ **B.** The graph is not a function.

What are the intercepts? Select the correct choice below and fill in any answer boxes within your choice.

- ○ **A.** The intercepts are ☐.
(Type an ordered pair. Type an exact answer using π as needed. Use a comma to separate answers as needed.)
- ○ **B.** There are no intercepts.
- ○ **C.** The graph is not a function.

Determine if the graph is symmetrical.

- ○ **A.** It is symmetrical with respect to the x-axis.
- ○ **B.** It is symmetrical with respect to the y-axis.
- ○ **C.** It is symmetrical with respect to the origin.
- ○ **D.** The graph is not symmetrical.
- ○ **E.** The graph is not a function.

18. Answer the questions about the following function.

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

(a) Is the point $\left(3, -\frac{7}{4}\right)$ on the graph of f?

(b) If x = 2, what is f(x)? What point is on the graph of f?

(c) If f(x) = 2, what is x? What point(s) are on the graph of f?

(d) What is the domain of f?

(e) List the x-intercept(s), if any, of the graph of f.

(f) List the y-intercept, if any, of the graph of f.

(a) Is the point $\left(3, -\frac{7}{4}\right)$ on the graph of f?

- ○ Yes
- ○ No

(b) If x = 2, what is f(x)?

f(2) = ☐

(Type an integer or a simplified fraction.)

Using this information, list a point on the graph of f.

☐

(Simplify your answer. Type an ordered pair, using integers or fractions.)

(c) If f(x) = 2, what is x?

x = ☐

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

Using this information, list a point on the graph of f.

☐

(Simplify your answer. Type an ordered pair, using integers or fractions.)

(d) What is the domain of f?

The domain is ☐.

(Type your answer in interval notation.)

(e) List the x-intercept(s), if any, of the graph of f.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ **A.** The x-intercept(s) is/are ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ○ **B.** There are no x-intercepts.

(f) List the y-intercept, if any, of the graph of f.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ **A.** The y-intercept(s) is/are ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ○ **B.** There are no y-intercepts.

19. A golf ball is hit with an initial velocity of 130 feet per second at an inclination of 45° to the horizontal. In physics, it is established that the height h of the golf ball is given by the function

$$h(x) = \frac{-32x^2}{130^2} + x,$$

where x is the horizontal distance that the golf ball has traveled.

(a) Determine the height of the golf ball after it has traveled 100 feet.

h = ☐ feet (Round to one decimal place.)

(b) What is the height after it has traveled 200 feet?

h = ☐ feet (Round to one decimal place.)

(c) What is the height after it has traveled 400 feet?

h = ☐ feet (Round to one decimal place.)

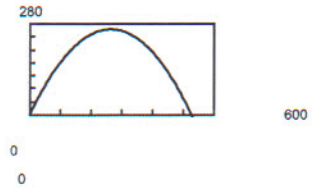
(d) How far does the golf ball travel before it lands?

x = ☐ feet (Round to one decimal place.)

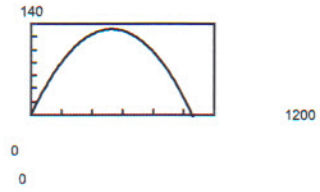
(e) Graph the function h = h(x).

Which of the following is the graph?

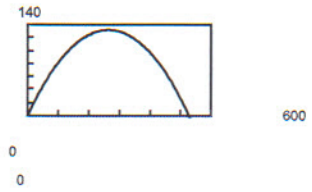
○ **A.**



○ **B.**



○ **C.**



(f) Use a graphing utility to determine the distance that the ball has traveled when the height of the ball is 90 feet.

○ **A.** The ball has traveled ☐ feet.
(Use a comma to separate answers as needed. Round to one decimal place.)

○ **B.** The ball has not traveled.

(g) Create a TABLE with TblStart = 0 and ΔTbl = 25. To the nearest 25 feet, how far does the ball travel before it reaches a maximum height? What is the maximum height?

To the nearest 25 feet, the ball travels ☐ feet.

The maximum height is ☐ feet.
(Round to the nearest whole number.)

(h) Adjust the value of ΔTbl until you determine the distance, to within 1 foot, that the ball travels before it reaches a maximum height.

☐ ft