1.1 Relations and Functions

1. **Relation:** A set of ordered pairs Ex: $\{(2,4),(-3,5),(-1,-3),(8,4)\}$

2. **Domain:**
The set of all abscissas (x's) of the ordered pairs (abscissa is the first element of an ordered pair)

3. **Range:**
The set of all ordinates (y's) of the ordered pairs (ordinate is the second element of an ordered pair)

4. **Function:**
A relation in which each element in the domain is paired with exactly one element in the range.

5. Given $\{(-3,2),(1,8),(-1,-3),(5,2)\}$ state the domain and range. Is this relation is a function?

D: {-3, 1, -1, 5} R: {2, 8, -3, 2} yes

6. If x is a negative integer greater than -4, state the relation representing the equation $y = x^2 - 5$
Then state the domain and range. {(-3, 4) (-2, -1) (-1, -4)} $f(x) = x^2 - 5$, $f(-3) = 4$

D: {-3, -2, -1} R: {4, -1, -4} yes

7. Given is an integer and $9 < x < 13$, state the ordered pairs from $y = 8 - 6x$. Is this a function? yes

{(10, -52) (11, -58) (12, -64)} D = {10, 11, 12} R = {-52, -58, -64}

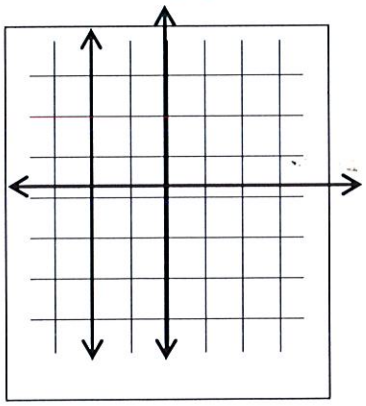
8. Specify one number in the table you could change so that the relation would NOT represent a function.

1960	1970	1980	~~1900~~ 1980	2000
13,000,000	19,700,000	18,000,000	16,700,000	19,700,000

9. **Vertical Line Test:**
If a vertical line passes through a graph more than once, the graph is not the graph of a function.

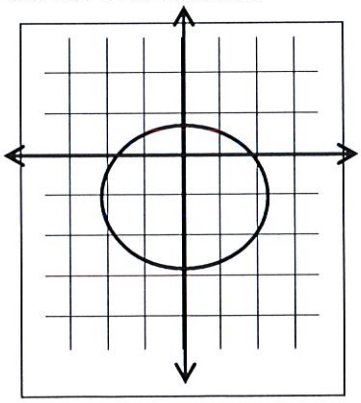
10. Determine if the graph of each relation is the set of a function

a.



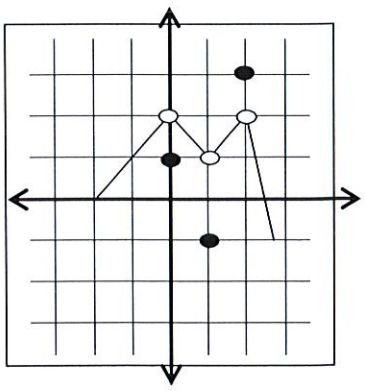
Yes/(No)

b.



Yes/(No)

c.



Yes/(No)

11. Function Notation:

$f(x)$, which is read "f of x." Interpreted as the value of the function f at x. $y = f(x)$ indicated that for each element in the domain that replaces x, the functions assigns one and only one replacement for y. Coordinates are (x, y) or $(x, f(x))$.

12. Find $f(-1)$ if $f(x) = -x^3 - 1$ $\quad f(-1) = -(-1)^3 - 1 = 0$

13. Find $f(-2)$ if $f(x) = \dfrac{x-1}{x^2}$ $\quad f(-2) = \dfrac{-2-1}{(-2)^2} = \dfrac{-3}{4}$

14. Factor each of the following expression.

a. $x^2 + 7x - 18$ $\quad (x+9)(x-2)$

b. $2n^2 + 13n - 24$ $\quad (2n-3)(n+8)$

c. $3m^2 - 7m - 20$ $\quad (3m+5)(m-4)$

d. $4m^2 - 11m - 3$ $\quad (4m+1)(m-3)$

e. $2w^3 - 8w$ $\quad 2w(w^2-4)$ $\quad 2w(w+2)(w-2)$

15. To find domain for a function, it is easiest to start by finding values that are not in the domain. Once you have found the values that are not in the domain then you can exclude those values when stating the domain.

16. State the domain in interval notation.

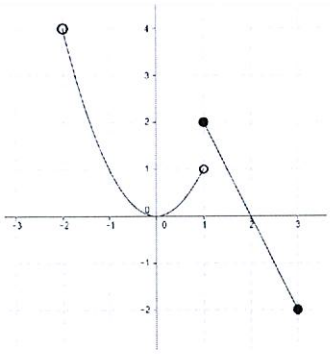
a. $f(x) = \dfrac{x^2}{x+1}$ $\quad x \neq -1$ $\quad (-\infty, -1) \cup (-1, \infty)$

b. $f(x) = \sqrt{x+3}$ $\quad x+3 \geq 0$ $\quad x \geq -3$ $\quad [-3, \infty)$

c. $f(x) = \sqrt{5-x}$ $\quad 5-x \geq 0$ $\quad -x \geq -5$ $\quad x \leq 5$ $\quad (-\infty, 5]$

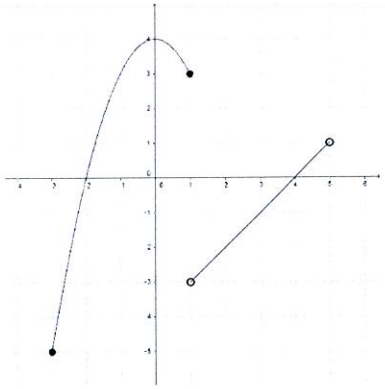
d. $f(x) = \dfrac{x}{x^2-16}$ change $\quad (x+4)(x-4)$ $\quad x \neq -4 \quad x \neq 4$ $\quad (-\infty, -4) \cup (-4, 4) \cup (4, \infty)$

e.



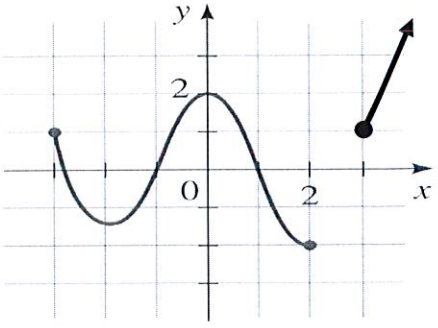
Domain: $(-2, 3]$

f.



Domain: $[-3, 5)$

g.



Domain: $[-3, 2] \cup [3, \infty)$

17. General Rules for finding Domain:

a. Linear function - a line with a slope has a domain $(-\infty, \infty)$

b. Quadratic Functions - has a domain $(-\infty, \infty)$

c. Square Root Functions - Radicand ≥ 0

d. Rationals (fractions with variables in the denominator)

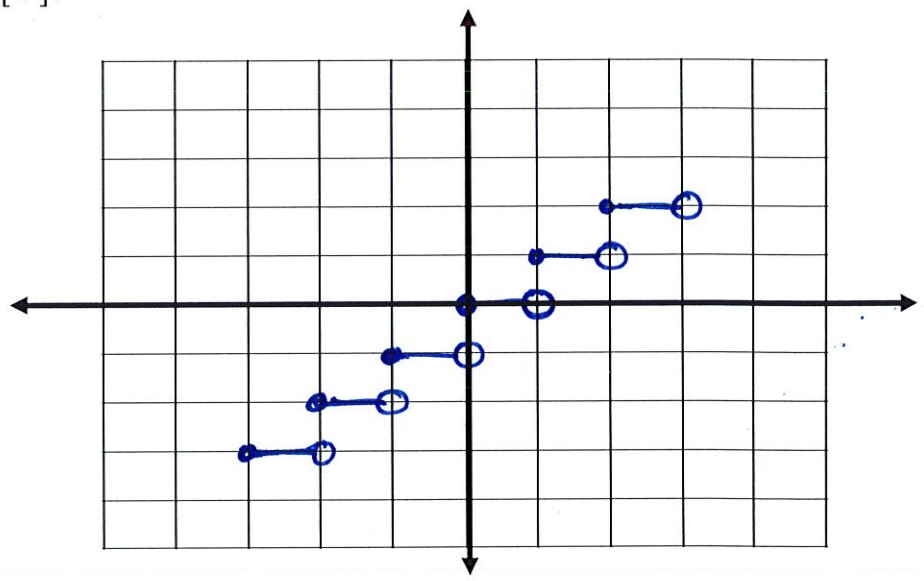
- All x's that don't make the denominator equal to zero

17. Greatest Integer Function (also known as the birthday function)

A type of step function. The symbol $[x]$ means the integer Not Greater than x. **ROUND DOWN!!!!!**

18. Fill in the table and graph for $y=[x]$.

x	y
-1.7	-2
-1.5	-2
-1.2	-2
-1.0	-1
-0.9	-1
-0.4	-1
0	0
0.3	0
0.7	0
1.0	1
1.5	1
1.8	1
2.0	2
2.6	2



19. Evaluate each for $f(x) = [x]$ and $g(x) = [3x] - 2$

a. $f(0.2) =$ 0 b. $f(2.9) =$ 2 c. $f(9) =$ 9 d. $f(-0.3) =$ -1

e. $g(-1.2) =$ -6 f. $g(-5.5) =$ -19 g. $g(-6) =$ -20 h. $g(0.1) =$ -2

$[-3.6] - 2$ $[-16.5] - 2$ $[-18] - 2$ $[.3] - 2$

Homework: Function Wksht , Domain Wksht, Google Doc in Announcements, AND enroll into Blackboard