Name _____

Concepts Worksheet 1

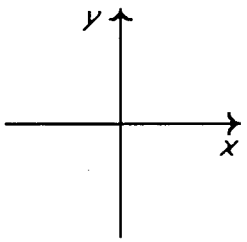
Chapter 1 For use after Article 1.4.

Graphical Analysis

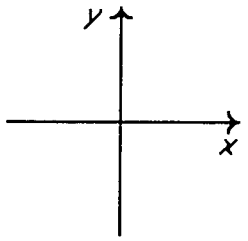
Chapter 1 deals with functions and their characteristics. To facilitate a study of functions, it is important to visualize mentally the graphical image of a function when given an algebraic description.

I. Graph each function. Clearly indicate units on the axes provided.

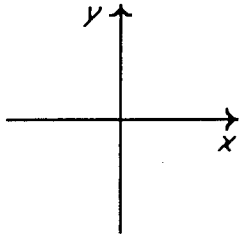
1. $f(x) = x$



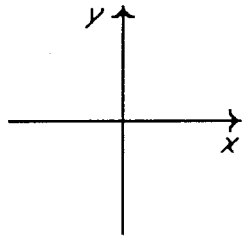
2. $f(x) = x^2$



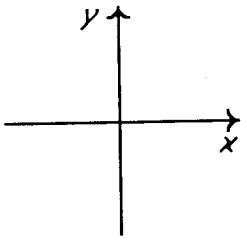
3. $f(x) = x^3$



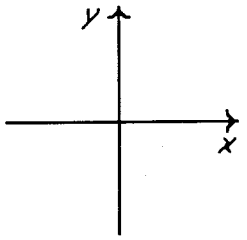
4. $f(x) = |x|$



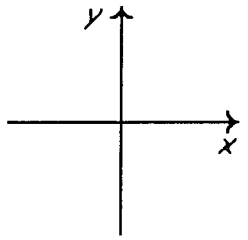
5. $f(x) = [x]$



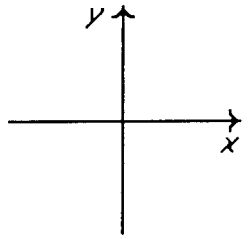
6. $f(x) = \sin x$



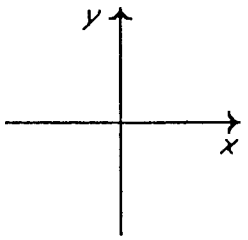
7. $f(x) = \cos x$



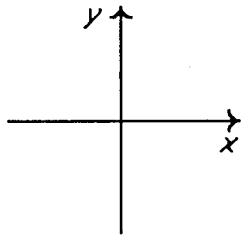
8. $f(x) = \tan x$



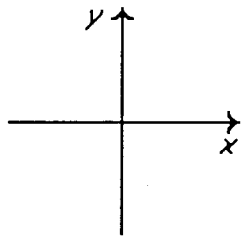
9. $f(x) = \sec x$



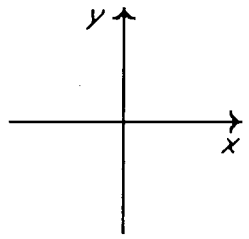
10. $f(x) = 2^x$



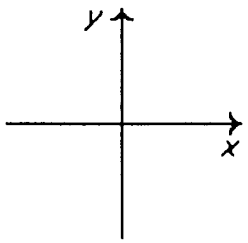
11. $f(x) = \log_2 x$



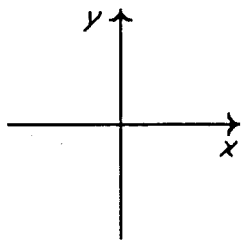
12. $f(x) = \frac{1}{x}$



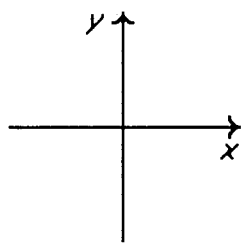
13. $f(x) = \frac{1}{x^2}$



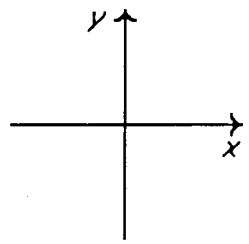
14. $f(x) = \sqrt{x}$



15. $f(x) = \sqrt{a^2 - x^2}$



16. $f(x) = \begin{cases} 0, & \text{if } x \text{ is rational} \\ 1, & \text{if } x \text{ is irrational} \end{cases}$



II. Graphical Analysis

II. Answer the following questions about the indicated functions. In completing the table below use the following abbreviations, R: the set of real numbers, J: the set of integers, and N: the set of natural numbers. NOTE: This exercise may need to be done as appropriate sections of Chapter 1 are completed.

Function	Domain	Range $y = f(x)$	Roots (Find x when $f(x) = 0$)	Symmetry with respect to y-axis or origin	Even or Odd Function— $f(-x) = f(x)$ or $f(-x) = -f(x)$	Is the function periodic? If so, state the period.	Is $f(x)$ a one-to-one mapping? (For each $f(x)$ only one x exists)	State the x coordinates of any points of discontinuity
1. $f(x) = x$								
2. $f(x) = x^2$								
3. $f(x) = x^3$								
4. $f(x) = \|x\|$								
5. $f(x) = [x]$								
6. $f(x) = \sin x$								
7. $f(x) = \cos x$								
8. $f(x) = \tan x$								
9. $f(x) = \sec x$								
10. $f(x) = 2^x$								
11. $f(x) = \log_2 x$								
12. $f(x) = 1/x$								
13. $f(x) = 1/x^2$								
14. $f(x) = \sqrt{x}$								
15. $f(x) = \sqrt{a^2 - x^2}$								
16. $f(x) = \begin{cases} 0, & x \text{ is rational} \\ 1, & x \text{ is irrational} \end{cases}$								

Section II (answers 1–16 on chart)

Function	Domain	Range $y = f(x)$	Roots (Find x when $f(x) = 0$)	Symmetry with respect to y-axis or origin	Even or Odd Function $f(-x) = f(x)$ or $f(-x) = -f(x)$	Is the function periodic? If so, state the period.	Is $f(x)$ a one-to-one mapping? (For each $f(x)$ only one x exists)	State the x coordinates of any points of discontinuity
1. $f(x) = x$	1R	1R	$x = 0$	origin	odd	no	yes	none
2. $f(x) = x^2$	1R	$y \geq 0$	$x = 0$	y-axis	even	no	no	none
3. $f(x) = x^3$	1R	1R	$x = 0$	origin	odd	no	yes	none
4. $f(x) = \lvert x \rvert$	1R	$y \geq 0$	$x = 0$	y-axis	even	no	no	none
5. $f(x) = [x]$	1R	$y = k$, $k \in J$	$0 \leq x < 1$	neither	neither	no	no	$x = k$, $k \in J$
6. $f(x) = \sin x$	1R	$\lvert y \rvert \leq 1$	$x = k\pi$, $k \in J$	origin	odd	2π	no	none
7. $f(x) = \cos x$	1R	$\lvert y \rvert \leq 1$	$x = (2k + 1)\pi/2$, $k \in J$	y-axis	even	2π	no	none
8. $f(x) = \tan x$	$x \in 1R$, $x \neq (2k + 1)\pi/2$, $k \in J$	1R	$x = k\pi$, $k \in J$	origin	odd	π	no	$x = (2k + 1)\pi/2$, $k \in J$
9. $f(x) = \sec x$	$x \in 1R$, $x \neq (2k + 1)\pi/2$, $j \in J$	$\lvert y \rvert \geq 1$	none	y-axis	even	2π	no	$x = (2k + 1)\pi/2$, $k \in J$
10. $f(x) = 2^x$	1R	$y > 0$	none	neither	neither	no	yes	none
11. $f(x) = \log_2 x$	$x > 0$	1R	$x = 1$	neither	neither	no	yes	none
12. $f(x) = 1/x$	$x \in 1R$, $x \neq 0$	$y \in 1R$, $y \neq 0$	none	origin	odd	no	yes	$x = 0$
13. $f(x) = 1/x^2$	$x \in 1R$, $x \neq 0$	$y > 0$	none	y-axis	even	no	no	$x = 0$
14. $f(x) = \sqrt{x}$	$x \geq 0$	$y \geq 0$	$x = 0$	neither	neither	no	yes	none
15. $f(x) = \sqrt{a^2 - x^2}$	$\lvert x \rvert \leq a$	$0 \leq y \leq a$	$x = \pm a$	y-axis	even	no	no	none
16. $x = \begin{cases} 0, & x \text{ is rational} \\ 1, & x \text{ is irrational} \end{cases}$	1R	$y = 1$ or $y = 0$	all rational numbers	y-axis	even	no	no	Every point is a point of discontinuity.