Name: _____ **Precalculus Unit 2, Lesson 1**

Aim: How do we test for functions algebraically? How do we evaluate functions?

I. Do Now:

(a) Given that $x = 4$ is a solution of the equation $x^3 + 4x^2 - 17x - 60 = 0$.

(i) Factor completely: $x^3 + 4x^2 - 17x - 60$

(ii) Find all roots of the above equation.

(b) Factor completely:

$2(3x-1)^2(2x+3) - 2(3x-1)(2x+3)^2$

(c) If $g(x) = x^2 - 4x + 7$, find:

(i) $g(2)$ | (ii) $g(-1)$ | (iii) $g(a)$ | (iv) $g(x+3)$

II. Development:

Recall: A **function** is a rule of correspondence that assigns to every element x in set A exactly one element y in set B. [Set A = the domain (set of inputs); Set B = the range (set of outputs)]

Characteristics of a Function:

1) Every element in set A must be "used" (i.e., matched to one element in set B)
2) Some elements in set B may be unmatched.
3) Two or more elements in set A may be matched to the same element in set B
4) An element of the domain cannot be mapped to two or more elements of the range.

Also:

one-to-one relation: Every element of the domain is mapped to **exactly** one element of the range.
many-to-one relation: Two or more elements of the domain are mapped to the same element of the range.
one-to-many relation: An element of the domain is mapped to two or more elements of the range.
onto relation: Every element of the range is "used" (i.e., has one or more elements mapped to it).

III. Further Development:

Consider $y = x^2$. Is this relation a function? Why or why not? Make a table of values:

x	y
–2	
-1	
0	
1	
2	

IV. Which of the following equations represent functions? Draw a graph, if possible. Explain your answer.

1. $y - x = 0$ | 2. $x^2 + y^2 = 4$ | 3. $x = y^3$ | 4. $y = -2x + 3$ | 5. $y = 3$ | 6. $x = 2$

V. Evaluate the functions for the given values of x:

7. $f(x) = \begin{cases} -x, & x < 0 \\ x, & x \geq 0 \end{cases}$
   (a) $f(-2)$
   (b) $f(0)$
   (c) $f(1)$

8. $g(x) = \begin{cases} x^2 + 1, & x < 0 \\ x + 1, & x \geq 0 \end{cases}$
   (a) $g(-1)$
   (b) $g(1)$
   (c) $g(0)$

9. $h(x) = \begin{cases} 3 - x, & x < 3 \\ x - 3, & x \geq 3 \end{cases}$
   (a) $h(0)$
   (b) $h(-2)$
   (c) $h(5)$

HW9
Read pages 16 – 18.
p. 24: 7, 8, 11, 12, 13, 22, 24, 29, 30, 33
p. 124: 49, 57