Unit #2 Functions

2.1 Function Notation

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Learning Targets:

1. SWBAT evaluate functions at given x-values usig function notation.

2. SWBAT evaluate values for a function by reading the values off of the graph of the function.

Definitions:

A relation is a set of ordered pairs which connects elements in the domain (x-values or inputs) with elements in the range (y-values or outputs).

A function is a rule or correspondence that connects an input number (domain element) with a single output number (range element).

For every x value there is one and only one y value!

Every function is a relation, but every relation is not a function!

You will recognize the following as an equation (a relationship between two variables)

$$y = 2x^2 - 3x + 1$$

This equation describes y as a function of x.

If we give this function the name *f*, we can use Function Notation.

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

This notation is read as the *"value of f at x "* or *"f of x"*.

$(b-7)(b-7)$

Ex. 1 If $f(x)=2x^2-3x$ find the following:

$f(4)$

$f(-5)=65$

$(-5, 65)$

$f(-5)$

$=2(-5)^2-3(-5)$

$=2(25)+15$

$=50+15=65$

$f(a)$

$f(b-7)$

$f(b-7)=2(b-7)^2-3(b-7)$

$=2(b^2-14b+49)-3b+21$

$=2b^2-28b+98-3b+21$

$=2b^2-31b+119$

Ex. 2 If $f(x)=\dfrac{x+2}{x}$ find the following:

$f(-2)$

$f(0)$

$$f\left(\frac{2}{3}\right) = \frac{\frac{2}{3} + \frac{6}{3}}{\frac{2}{3}} = \frac{\left(\frac{8}{3}\right)}{\left(\frac{2}{3}\right)}$$

$$= \left(\frac{8}{3}\right)\left(\frac{3}{2}\right) = 4$$

Ex. 3 If $f(x) = 1 - 4x - x^2$, find :

$a)\ \ f(3k)$

b) $f\left(\dfrac{3}{x}\right)$

If $f(x) = x^2 - x$, find

c) $\dfrac{f(x+h) - f(x)}{h}$

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

$$= \frac{x^2 + 2xh + h^2 - x - h - x^2 + x}{h}$$

$$= \frac{2xh + h^2 - h}{h} = \frac{h(2x + h - 1)}{h}$$

If $f(x) = 2x^2 + 1$

find $\dfrac{f(x+h) - f(x)}{h}$

$$= \frac{2(x+h)^2 + 1 - (2x^2 + 1)}{h}$$

$$= \frac{2(x^2 + 2xh + h^2) + 1 - 2x^2 - 1}{h}$$

$$= \frac{\cancel{2x^2} + 4xh + 2h^2 \cancel{+1} - \cancel{2x^2} \cancel{-1}}{h}$$

$$= \frac{4xh + 2h^2}{h} = \frac{\cancel{h}(4x + 2h)}{\cancel{h}}$$

If $f(x) = 1 - 4x - x^2$, find

$d)\ x, \text{if } f(x) = -31$

$$-31 = 1 - 4x - x^2$$

$$x^2 + 4x - 32 = 0$$

$$(x+8)(x-4) = 0$$

$x = -8$ OR $x = 4$

Your Turn #4

Examine the graph of the function below to answer each of the following questions.

Find:

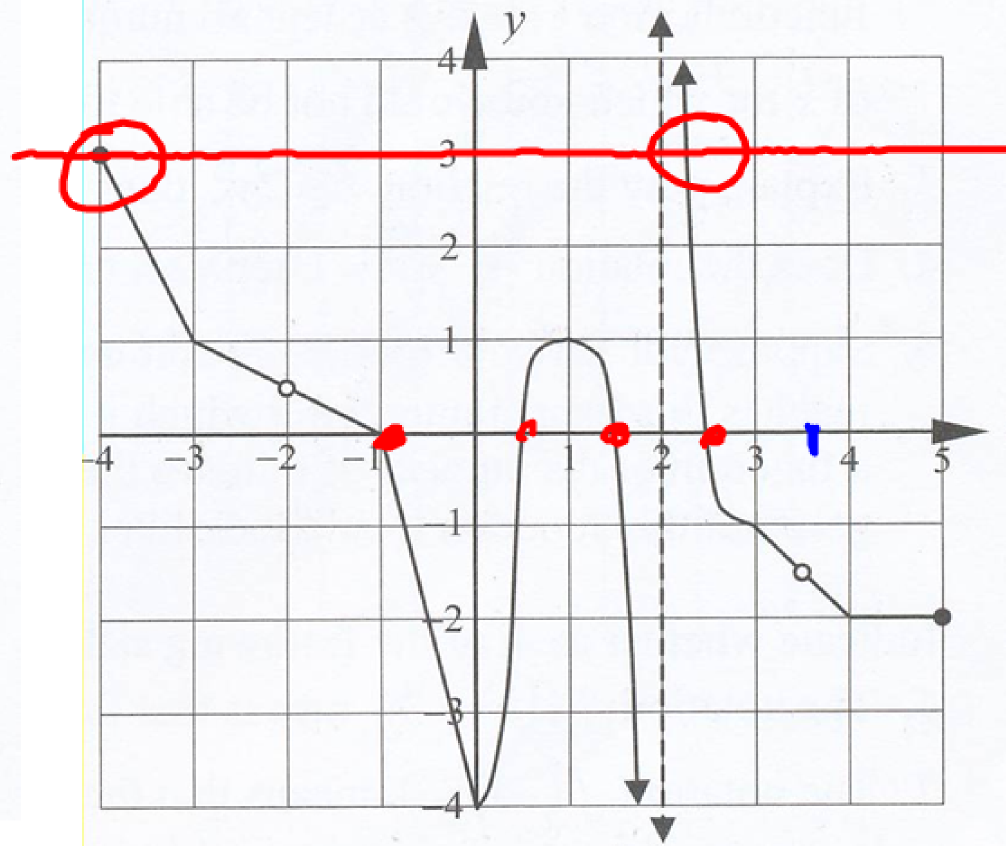
(a) $g(1)$ = 1

(b) $g(-4)$ = 3

(c) $g(3.5)$ UND

(d) four values of x for which $g(x)=0$

(e) r, if $g(r)=3$ and $r<0$.



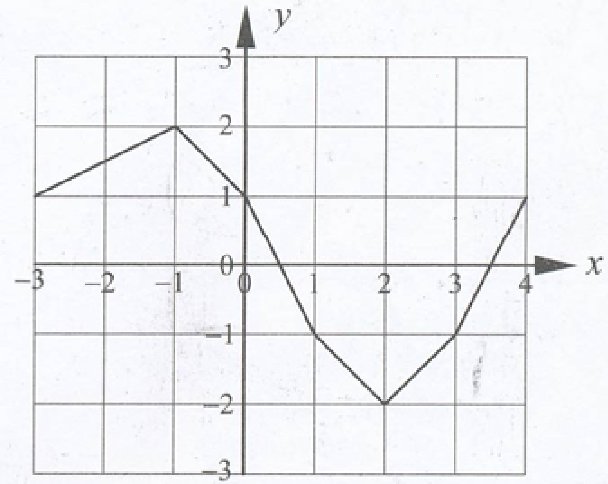
$y=g(x)$

d) $x = -1, \frac{1}{2}, 3/2, 5/2$

e) $x = -4$

Assignment:
Page 55
#'s 1a,c,e,f, 2 a-d, 3, 4b,c,d,5 -11,14

Answer questions 6 to 10 by referring to the graph of the function $y = f(x)$ over the domain $[-3,4]$ shown at right.



6. Find: (a) $f(-1)$ (b) $f(3)$ (c) $f(2.5)$ (d) $f(0)$
7. Find all values of c for which $f(c)=1$.
8. Find all values of r for which $f(r)=-2$.
9. Find all values of t for which $f(t)=0$.
10. Find all values of s in the interval $[0,4]$ for which $f(s)=-1$.