

INTERMEDIATE ALGEBRA

GPS #6

2.1 FUNCTIONS AND THEIR REPRESENTATIONS

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Useful Definitions:

- * A relation is a set of ordered pairs. For example: $\{(-1, 4), (-3, 5), (1, 2), (7, -2)\}$
- * A function is a relation in which, for each value of the first component of the ordered pairs, there is exactly one value of the second component.
- * In a relation, the set of all values of the independent variable is the domain; the set of all values of the dependent variable is the range.
- * Vertical Line Test: If every vertical line intersects the graph of a relation only once, the relation is a function.

1. State whether each relation defines a function and give the domain and range.

a) $\{(-1, 4), (-3, 5), (1, 2), (7, -2)\}$

-1	4
-3	5
1	2
7	-2

domain: $\{-1, -3, 1, 7\}$ - must use squiggly line
 Range: $\{4, 5, 2, -2\}$

= function

b) $\{(2, 7), (3, -4), (2, 0), (1, -2)\}$

2	7
3	-4
2	0
1	-2

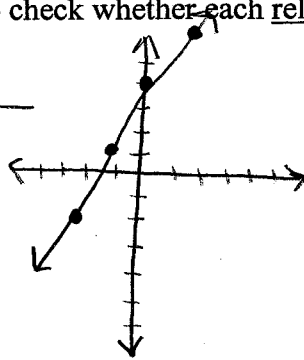
domain: $\{2, 3, 1\}$
 range: $\{7, -4, 0, -2\}$

= not a function

2. Use "vertical line test" to check whether each relation defines y as a function of x. Give the domain.

a) $y = 3x + 4$

x	y
0	4
1	7
-1	1
-2	-2



$y = f(x)$
 function

y is a function of x

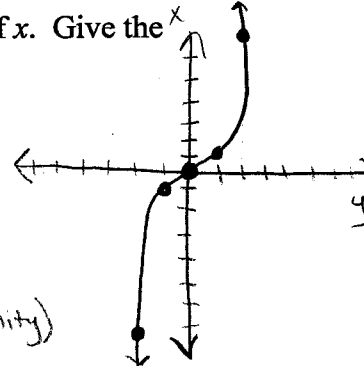
cubic function

b) $y = x^3$

x	y
0	0
1	1
-1	-1
2	8
-2	-8

non-linear function

domain: ∞ (infinity)
 D: $(-\infty, +\infty)$
 R: $(-\infty, +\infty)$

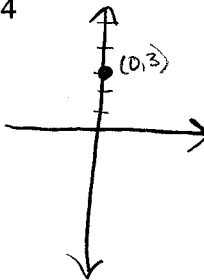


3. Let $f(x) = -2x + 3$ and $g(x) = -\frac{1}{4}x^2 + 3x + 1$. Find the following.

a) $f(1) = -2(1) + 3 = 1$

c) $f(m) = -2(m) + 3 = -2m + 3$

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



b) $g(-2) = -\frac{1}{4}(-2)^2 + 3(-2) + 1$
 $= -\frac{1}{4}(4) - 6 + 1 = -6$

d) $g(-x) = -\frac{1}{4}(-x)^2 + 3(-x) + 1$

e) $g(-k) = -\frac{1}{4}(-k)^2 + 3(-k) + 1$
 $= -\frac{1}{4}k^2 - 3k + 1$

4. For each function, find $f(1)$ and $f(-2)$.

a) $f = \{(-2, 4), (3, 6), (1, 0), (7, 2)\}$

$f(1) = 0$
 $f(-2) = 4$

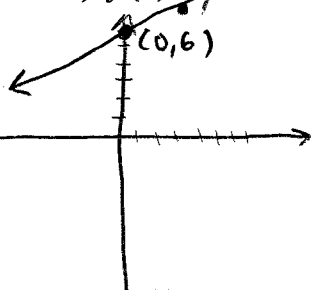
b) $f = \{(1, 2), (-3, 0), (-2, 9), (4, 2)\}$

5. Graph each linear function. Give the domain and range. Label the function and the points.

a) $f(x) = 3x + 6$

x	y
0	6
1	9

D: $(-\infty, +\infty)$
 R: $(-\infty, +\infty)$



b) $g(x) = -\frac{1}{2}x + 1$

x	y
0	1
1	-1/2

D: $(-\infty, +\infty)$
 R: $(-\infty, +\infty)$

