COLLEGE ALGEBRA

NAME: Amanda Laird

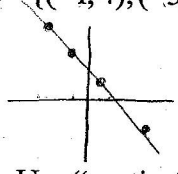
GPS # 1 **1.1** **FUNCTIONS AND MODELS** Class Time: 11:30 Date: 1-8-08

Useful Definitions: Let X and Y be two nonempty sets.

* 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.
* A function from X into Y is a relation that associates with each element of X exactly one element of Y
* 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.

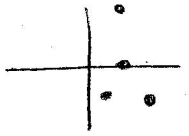
1. State whether each relation defines a function and give the domain and range.

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



Function
d: {-1, -3, 1, 7}
r: {4, 5, 2, -2}

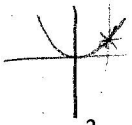
b) $\{(2,7),(3,-4),(2,0),(1,-2)\}$



not a function
d: {2, 3, 1}
r: {7, -4, 0, -2}

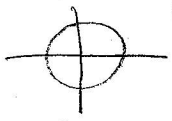
2. Use "vertical line test" to check whether each relation defines y as a function of x. Give the domain.

a) $y = x^2$



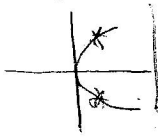
Function
d: $(-\infty, \infty)$

b) $x^2 + y^2 = 1$



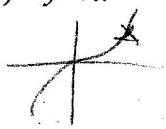
Not a function d: $[-1, 1]$

c) $x = y^2$



Not a function d: $[0, \infty)$

d) $y = x^3$



Function
d: $(-\infty, \infty)$

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

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

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

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

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

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

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

f) $f(x+h) - f(x) = -2(x+h) + 3 - (-2x + 3)$

$-2x - 2h + 3 + 2x - 3$

$= f(x+h) - f(x) = -2h$

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

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

4. Find the domain of each of the following functions:

a) $f(x) = x^2 + 5$

d: $(-\infty, \infty)$

b) $g(x) = \frac{1}{4}x - 3$

d: $(-\infty, \infty)$

c) $r(t) = \frac{2t}{t^2 - 9}$ $(t-3)(t+3) = 0$

d: $\{t \mid t \neq \pm 3\}$

b) $h(u) = \sqrt{10 - 2u}$

d: $(-\infty, 5]$