COLLEGE ALGEBRA +2

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GPS # 1 **1.1** **FUNCTIONS AND MODELS** Class Time: 11:30-12:45 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) $\{(-1,4),(-3,5),(1,2),(7,-2)\}$

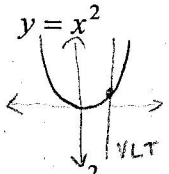
Function
domain: $\{-1,-3,1,7\}$
range: $\{4,5,2,-2\}$

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

Not a function
domain: $\{2,3,1\}$
range: $\{7,-4,0,-2\}$

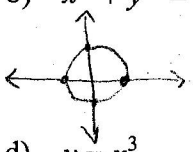
2. Use "vertical line test" to check whether each relation defines y as a function of x. Give the domain.

a) $y=x^2$



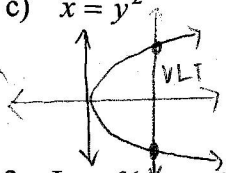
It is a Function | domain: $(-\infty,\infty)$

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



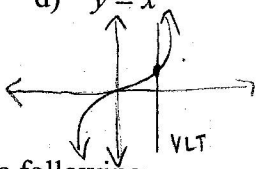
Not a Function | domain: $[-1,1]$

c) $x=y^2$



Not a Function | Domain: $[0,\infty)$

d) $y=x^3$



It is a Function | Domain: $(-\infty,\infty)$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

domain: $\{T \mid T\neq\pm3\}$

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

domain: $(-\infty,5]$

y = mx + b = linear