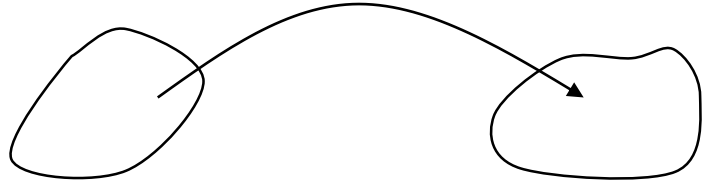What is a function?

4 Ways to Represent a Function:

1. Verbally ( ) Ex: Favorite Ice Cream Flavor	2. Analytically ( ) Ex: $f(x) = 3x - 4$ or $y = 3x - 4$
3. Numerically ( ) Ex: Ball Bounce	4. Visually ( ) Ex: EKG Reading

For box 3 (Numerically / Ball Bounce):

Drop Height (in)	Bounce Height (in)
36	25.0
40	29.0
44	31.5
48	35.0
52	37.5
56	42.0
60	46.5

For box 4 (Visually / EKG Reading):

LOC 00000-0000   Speed:25 mm/sec   Limb:1

Independent Variable: Represents

Dependent Variable: Represents

Many functions represented in all 4 ways:
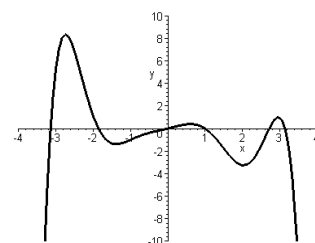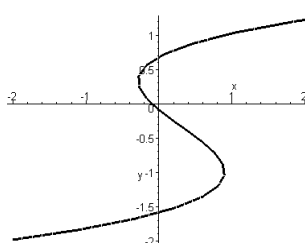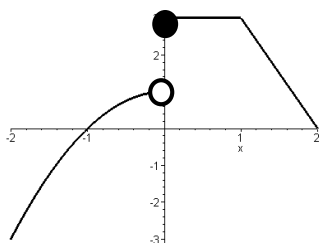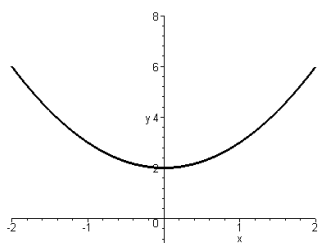
Ex: Words: *Multiply by 3 then subtract 4.*   Equation: $y = 3x - 4$

Table: Graph:

1

Functions

Which of the following graphs represent functions?

Why?

Forms of Functions

$x^2 + 2y = 1$

$y = \dfrac{1}{2}(1 - x^2)$

$f(x) = \dfrac{1}{2}(1 - x^2)$

Ex: Find $f(-3)$ Ex: Find $f(4x)$

Ex: Given $f(x) = x^2$, find and simplify $\dfrac{f(x+\Delta x) - f(x)}{\Delta x}$

2

Domain and Range:

Domain:

May be given **explicitly**   or   **implicitly**

Range:

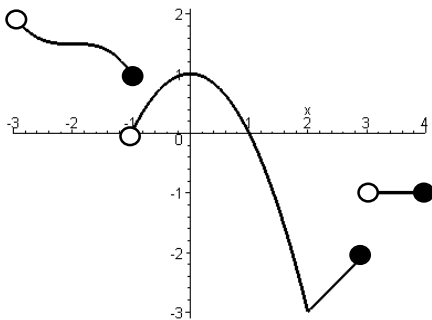Ex: State the domain and range for the following functions:

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

c) $f(x) = \frac{1}{x+1}$

b) $f(x) = \sqrt{x}$

d) $f(x) = \frac{1}{\sqrt{x+1}}$

Piecewise Function:

$$f(x) = \begin{cases} -\dfrac{1}{2}(x+2)^3 + \dfrac{3}{2} & , & -3 < x \le -1 \\ -x^2 + 1 & , & -1 < x < 2 \\ x - 5 & , & 2 \le x \le 3 \\ -1 & , & 3 < x \le 4 \end{cases}$$

Domain:

Range:

When is the function increasing?

When is the function decreasing?

3

Ex: Given $f(x) = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$

a) Make a table of values and sketch the function

b) What is the domain and range?

c) Do you recognize this function? If so, what is it?

Symmetry:

Even Functions

Odd Functions

Ex: Without using a graph, determine whether the following functions are odd, even, or neither.

a) $f(x) = x - x^2$

b) $f(x) = x^3 + x$