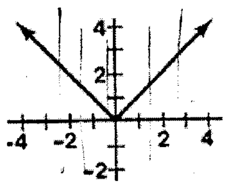
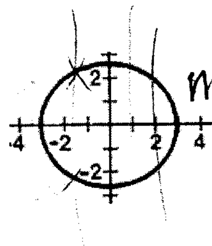
NOTES-- Vocabulary Review

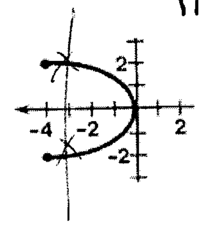
function -- a relation in which each x has exactly one y (use the vertical line test)



yes



no



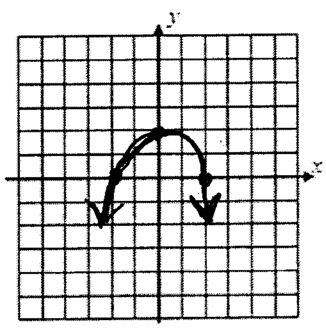
no

domain -- set of x-values

range -- set of y-values

x-intercepts -- where a graph crosses the x-axis
roots
zeros

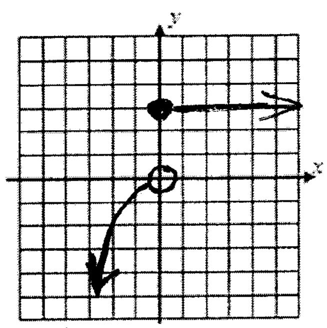
Example 1 Name the domain, range and x-intercepts for each function.



domain: all real #'s $(-\infty, \infty)$

range: $y \leq 2$ $(-\infty, 2]$

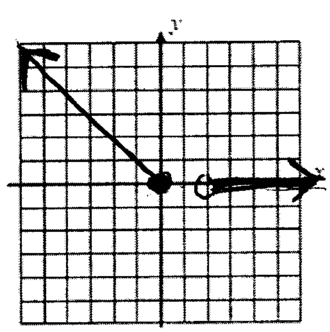
x-intercepts: $x = 2$ and $x = -2$



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

range: $(-\infty, 0) \cup \{3\}$

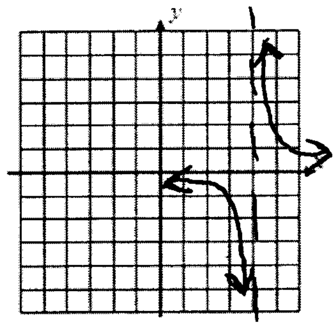
x-intercepts: none



domain: $(-\infty, 0] \cup (2, \infty)$

range: $[0, \infty)$

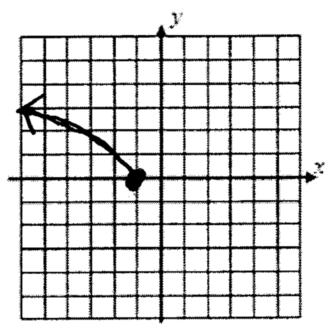
x-intercepts: $x = 0$ and $x > 2$



domain: $(-\infty, 4) \cup (4, \infty)$

range: $(-\infty, 0) \cup (0, \infty)$

x-intercepts: none



domain: $(-\infty, -1]$

range: $[0, \infty)$

x-intercepts: $x = -1$

symmetry -- when a graph remains unchanged reflected about an axis or a point

	Symmetry with respect to the x–axis	Symmetry with respect to the y–axis	Symmetry with respect to the Origin
Graphical Condition	If (x, y) is on the graph, then $(x, -y)$ is on the graph.	If (x, y) is on the graph, then $(-x, y)$ is on the graph.	If (x, y) is on the graph, then $(-x, -y)$ is on the graph.
Graphical Interpretation	x–axis acts a as mirror (reflection in the x–axis)	y–axis acts as a mirror (reflection in the y–axis)	1.) reflection in the y-axis, 2.) followed by reflection in the x–axis or visa versa …
Test Condition	Replace y with $-y$	Replace x with $-x$	Replace x with $-x$, AND y with $-y$
	If an equivalent equation results, the graph has the desired symmetry. Hint → Think OPPOSITE		

Example 2 Check each equation for the indicated symmetry.

A. $y^2 - 2 = x - 3$; x-axis

$(-y)^2 - 2 = x - 3$ yes

$y^2 - 2 = x - 3$

B. $y = 3x - 5$; x-axis

$-y = 3x - 5$ no

$y = -3x + 5$

C. $5y = x^2 + 4$; y-axis

$5y = (-x)^2 + 4$ yes

$5y = x^2 + 4$.

D. $y^2 - 2 = x - 3$; y-axis

$y^2 - 2 = -x - 3$ no

E. $x^2 + y^2 = 16$; origin yes

$(-x)^2 + (-y)^2 = 16$

$x^2 + y^2 = 16$

F. $y = x^2 + 4$; origin no

$-y = (-x)^2 + 4$

$-y = x^2 + 4$ $y = -x^2 - 4$

even function -- symmetric w.r.t. y-axis

odd function -- symmetric w.r.t. origin

} find $f(-x)$

same → even

opposite → odd

Example 3 Determine if each function is even, odd or neither.

A. $f(x) = -x^3$

$f(-x) = -(-x)^3 = x^3$

ODD

B. $f(x) = x^2 + 5$

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

EVEN

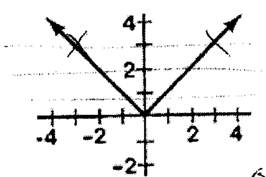
C. $y = x^5 - 1$

$f(-x) = (-x)^5 - 1$

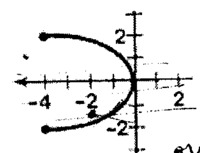
$= -x^5 - 1$

NEITHER

one-to-one -- the inverse is a function (use the horizontal line test)

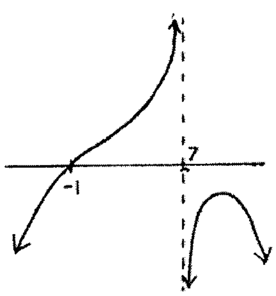


not one-to-one



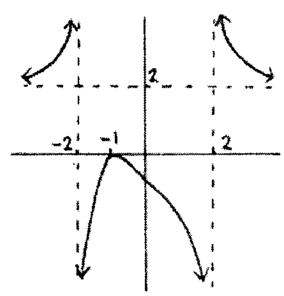
one-to-one

asymptote -- a line that the graph of a function approaches



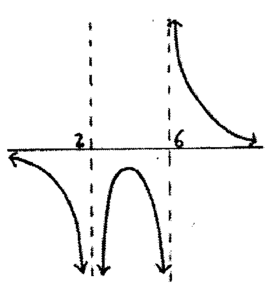
H.A. none

V.A. $x = 7$



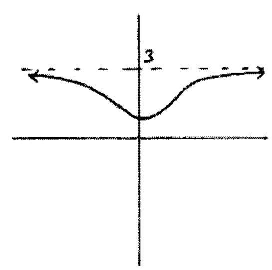
H.A. $y = 2$

V.A. $x = -2$ and $x = 2$



H.A. $y = 0$

V.A. $x = 2$ and $x = 6$



H.A. $y = 3$

V.A. none