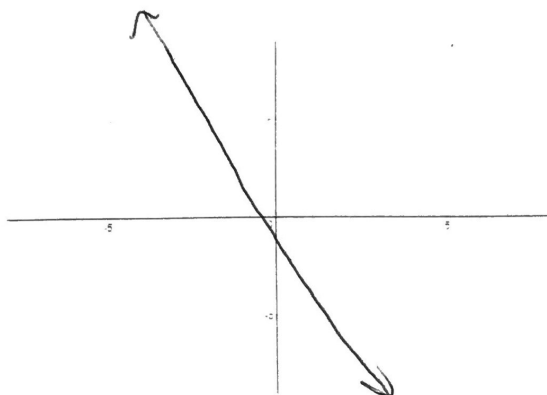


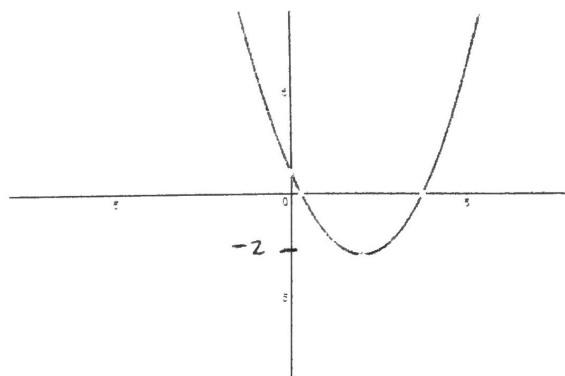
Name: Key

HIGHLY ENCOURAGED SUGGESTION: Pretend this is your test. Complete it without looking at your notes. When you finish, look at the answer key, mark the problems you got wrong, and fix them using your notes. This will help you determine where you need to focus your efforts.

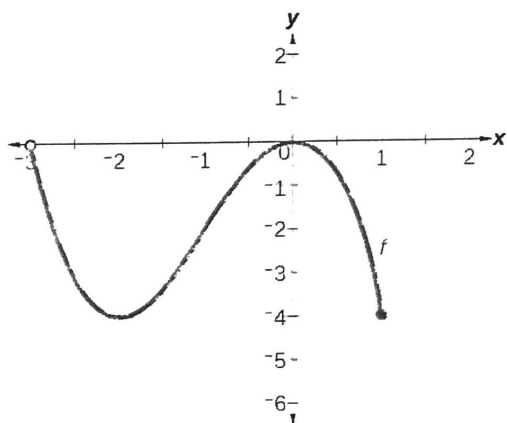
Part I: Determine whether the relation is a function (yes/no). Then, write the domain and range of each.



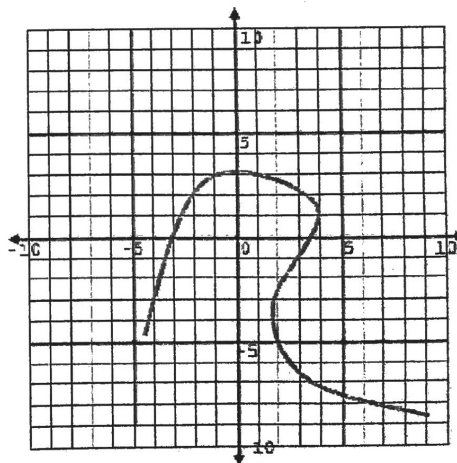
Function: yes
Domain: \mathbb{R} or $(-\infty, \infty)$
Range: \mathbb{R} or $(-\infty, \infty)$



Function: yes
Domain: \mathbb{R} or $(-\infty, \infty)$
Range: $[-2, \infty)$



Function: yes
Domain: $[-3, 1]$
Range: $[-4, 0]$



Function: no
Domain: $[-5, 9]$
Range: $[-8.5, 3]$

Part II: Describe transformation (stretch, shrink, shift) from the parent function.

$$y = x^2$$

$$y = |x|$$

$$y = \sqrt{x}$$

$$y = (x-2)^2 + 1$$

$$y = \frac{1}{2}|x| - 1$$

$$y = 4\sqrt{x+1} - 3$$

shift right 2
shift up 1

shrink vertically
shift down 1

stretch vertically
shift left 1
shift down 3

Part III: Use the functions below to evaluate or find each new function. Write your answer in simplest form.

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

$$g(x) = x^2 + 2$$

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

$$f(4) = 3(4) - 2 = 10$$

$$g(-1) = (-1)^2 + 2 = 3$$

$$h(5) = -(5) + 3 = -2$$

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

$$g(x-2) = (x-2)^2 + 2 = (x-2)(x-2) + 2 = x^2 - 4x + 4 + 2 = x^2 - 4x + 6$$

x	-2
x ²	-2x
-2x	4

$$(f+g)(0) = f(0) + g(0) = 3(0) - 2 + (0)^2 + 2 = -2 + 2 = 0$$

$$(g-h)(-2) = g(-2) - h(-2) = (-2)^2 + 2 - (-(-2) + 3) = 6 - 5 = 1$$

$$(f \cdot g)(1) = f(1) \cdot g(1) = (3(1) - 2) \cdot (1)^2 + 2 = 1 \cdot 3 = 3$$

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

$$(g+h)(x) = g(x) + h(x) = (x^2+2) + (-x+3) = x^2 - x + 5$$

$$(f \cdot h)(x) = f(x) \cdot h(x) = (3x-2)(-x+3) = -3x^2 + 11x - 6$$

3x	-2
-3x ²	2x
9x	-6

$$(f \circ g)(2) = f(g(2)) = f(6) = 3(6) - 2 = 16$$

$$(g \circ f)(2) = g(f(2)) = g(4) = (4)^2 + 2 = 18$$

$$(f \circ h)(x) = f(h(x)) = 3(-x+3) - 2 = -3x + 9 - 2 = -3x + 7$$

$$(h \circ f)(x) = h(f(x)) = -(3x-2) + 3 = -3x + 2 + 3 = -3x + 5$$

Part IV: Evaluate the following piecewise function.

$$f(x) = \begin{cases} -x+2 & \text{if } x < 1 \\ 2 & \text{if } 1 \leq x < 5 \\ \frac{1}{2}x+1 & \text{if } 5 < x \end{cases}$$

$$f(8) = \frac{1}{2}(8) + 1 = 5$$

$$f(0) = -(0) + 2 = 2$$

$$f(1) = 2$$

$$f(-2) = -(-2) + 2 = 4$$

Part V: Find the inverse of each function. Determine whether the inverse forms a function.

$$f(x) = x^2 - 1$$

$$g(x) = 7x + 5$$

$$h(x) = \sqrt{x+1}$$

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

$$x = y^2 - 1$$

$$x = 7y + 5$$

$$x = \sqrt{y+1}$$

$$x = \frac{1}{3}y - 4$$

$$x+1 = y^2$$

$$\sqrt{x+1} = y$$

yes, this is a function

$$\frac{x-5}{7} = \frac{7y}{7}$$

$$\frac{x-5}{7} = y$$

yes, this is a function

$$x^2 - 1 = y$$

yes, this is a function

$$3 \cdot \frac{x+4}{3} = \frac{1}{3}y \cdot 3$$

$$3x+12 = y$$

yes, this is a function