$$x^2+y^2+8x+4y+16=0$$

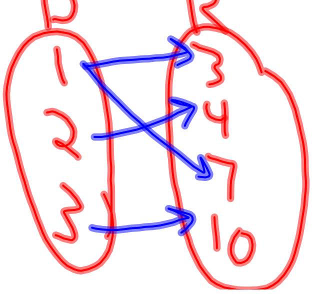
$$\underbrace{x^2+8x+\underline{16}}+y^2+4y+\underline{4} = -16+\overset{4}{16}$$

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

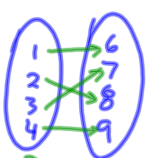
Chapter 1.4: Basics of Functions

Relation: Any set of ordered pairs where the first value is the domain and the second value is the range

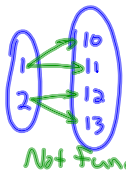
$(1,3);(2,4);(1,7);(3,10)$



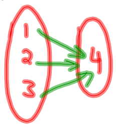
Function: Every value in the domain
is mapped to one value in the range.



function



Not function

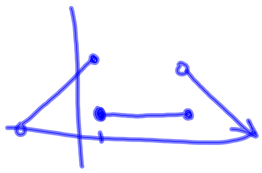


function

$x^2+y^2=16$

not function

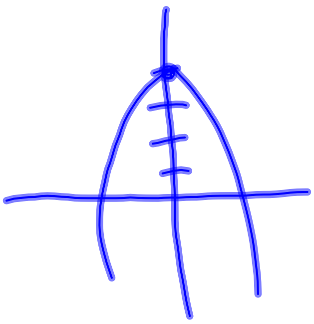
Vertical line Test:



is it a function:

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

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



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

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

$$y = \pm\sqrt{4-x^2}$$

$f(x) = x^2 + 3x + 5$

$f(2)$

$(2)^2 + 3(2) + 5$

$4 + 6 + 5$

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$f(x+3)$

$(x+3)^2 + 3(x+3) + 5$

$x^2 + 6x + 9 + 3x + 9 + 5$

$\boxed{x^2 + 9x + 23}$

$f(-x)$

$(-x)^2 + 3(-x) + 5$

$\boxed{x^2 - 3x + 5}$

Difference Quotient:

$$\frac{f(x+h) - f(x)}{h}, \ h \neq 0$$

$f(x) = x^2 + 3x + 5$

$$\frac{(x+h)^2 + 3(x+h) + 5 - (x^2 + 3x + 5)}{h}$$

$$\frac{\cancel{x^2} + 2xh + h^2 + \cancel{3x} + 3h + \cancel{5} \cancel{- x^2} \cancel{- 3x} \cancel{- 5}}{h}$$

$$\frac{h^2 + 2xh + 3h}{h}$$

$$\frac{\cancel{h}(h + 2x + 3)}{\cancel{h}}$$

$\boxed{h + 2x + 3}$

Functions of more than one equation

$f(0) = 3$

$$f(x) = \begin{cases} x^2 + 3 & x \le 0 \\ x - 2 & x > 0 \end{cases}$$

$f(2) = 0$ $\quad f(-10) = (-10)^2 + 3$

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#2, 4, 8, 12, 16, 24, 32,

38, 42, 46, 50, 52, 58, 70