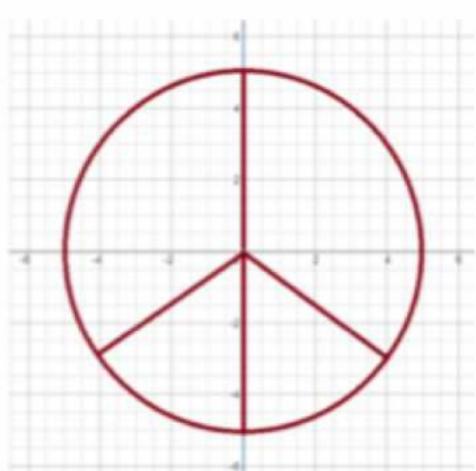


## Piecewise Functions

Peace-wise Function

$$g(x) = \begin{cases} \frac{3}{4}x & \text{if } -4 \leq x \leq 0 \\ +\sqrt{25-x^2} & \text{if } -5 \leq x \leq 5 \\ -\frac{3}{4}x & \text{if } 0 \leq x \leq 4 \\ \text{all real numbers between -5 and 5} & \text{if } x = 0 \end{cases}$$


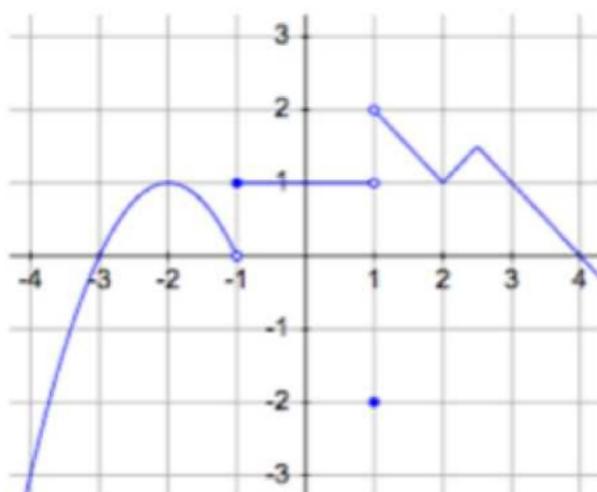
This is a tremendous function... (even if it fails the vertical line test!)

LanceAF #223 (1-12-16) 

\*See printout.

## Piecewise Functions

A piecewise function is a function defined by multiple sub-functions.



ex. Evaluate.

$$f(x) = \begin{cases} -2, & x < 4 \\ \frac{3}{5}x - 5, & 4 \leq x < 6 \\ x, & x \geq 6 \end{cases}$$

a)  $f(0) = -2$

c)  $f(6) = 6$

b)  $f(5) = \frac{3}{5}(5) - 5 = -2$

d)  $f(-1) = -2$

ex. Evaluate.

$$f(x) = \begin{cases} x + 2, & x \leq 1 \\ -3x + 1, & x > 1 \end{cases}$$

a)  $f(-6) = -6 + 2$   
 $= -4$

c)  $f(2)$   
 $-3(2) + 1$   
 $-6 + 1 = -5$

b)  $f(1) = 3$

d)  $f(4)$   
 $-3(4) + 1$   
 $-11$

ex: Evaluate.

$$x^{-n} = \frac{1}{x^n}$$
$$f(x) = \begin{cases} 8x - 1, & x < 0 \\ -18, & 0 \leq x < 5 \\ 3x^{-2}, & x \geq 5 \end{cases}$$

$6^2 = 36$

a)  $f(-3)$   
1<sup>st</sup> piece

$$-25$$

$$8(-3) - 1$$

$$f(6) = 3 \cdot 6^{-2}$$

$$= 3 \cdot \frac{1}{6^2}$$

c)  $f(0) = -18$

$$= \frac{3}{36} = \frac{1}{12}$$

ex: Evaluate.

$$g(x) = \begin{cases} |2x-1|, & x > 6 \\ \frac{1}{x}, & 1 < x \leq 6 \\ x^3, & x = 1 \end{cases}$$

a)  $g(5) = \frac{1}{5}$       c)  $g(0)$  undefined

b)  $g(1) = 1^3 = 1$       d)  $g(10) |2 \cdot 10 - 1|$

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ex. Evaluate.

$$f(x) = \begin{cases} \sqrt{1 - (x+4)^2}, & -5 \leq x < -4 \\ x + 3, & -4 \leq x \leq 0 \\ -|x-4|, & x > 0 \end{cases}$$

a)  $f(-5)$   
1st  $\sqrt{1 - (-5+4)^2}$   
 $\sqrt{|-1|} = 0$

b)  $f(-4) = -4 + 3$   
2nd  $-1$

c)  $f(-1) = -1 + 3 = 2$   
2nd

d)  $f(2) = -|2-4|$   
3rd  $-|-2| = -2$

$$\frac{2}{1} \cdot \frac{3}{4},$$

6

$$\frac{8 \cdot \frac{3}{4}}{1}$$

$$\frac{24}{4}$$

6

$$8 \div \frac{4}{3}$$

$$\frac{24}{2}$$

$$8 \cdot \frac{3}{4}$$

$$24 \div 2$$

$$24 \cdot \frac{1}{2}$$

$$\begin{array}{r} 5 - \frac{3}{4} \\ \hline 4 \end{array}$$
$$\frac{20 - 3}{4}$$

$$\frac{17}{4} = 4\frac{1}{4}$$

$$10 - \frac{1}{4}$$
$$11 - \frac{3}{7}$$
$$10\frac{4}{7}$$
$$9\frac{3}{4}$$
$$3 - \frac{1}{3}$$
$$2\frac{2}{3}$$