

Graphing Piecewise Functions: More Examples

Example 1

Graph the piecewise function:

$$f(x) = \begin{cases} -x+2 & x < 1 \\ 3x-4 & x \geq 1 \end{cases}$$

The steps are the same as in the previous set of notes, except in this example we are going to plot both rays simultaneously:

Step 1: Draw the Fence.

The fence is the line $x = 1$ (see Step 1, below).

Step 2: Draw the Lines

We draw each ray as a full line (see Step 2, below).

Step 3: Put the Points on the Fences

The first ray does not own the fence (because its x condition does not have the equal sign), so its point on the fence is shown as an open circle. The y -value for that coordinate point is:

$$\begin{aligned} y &= -x + 2 \\ y &= -(1) + 2 \\ y &= 1 \end{aligned}$$

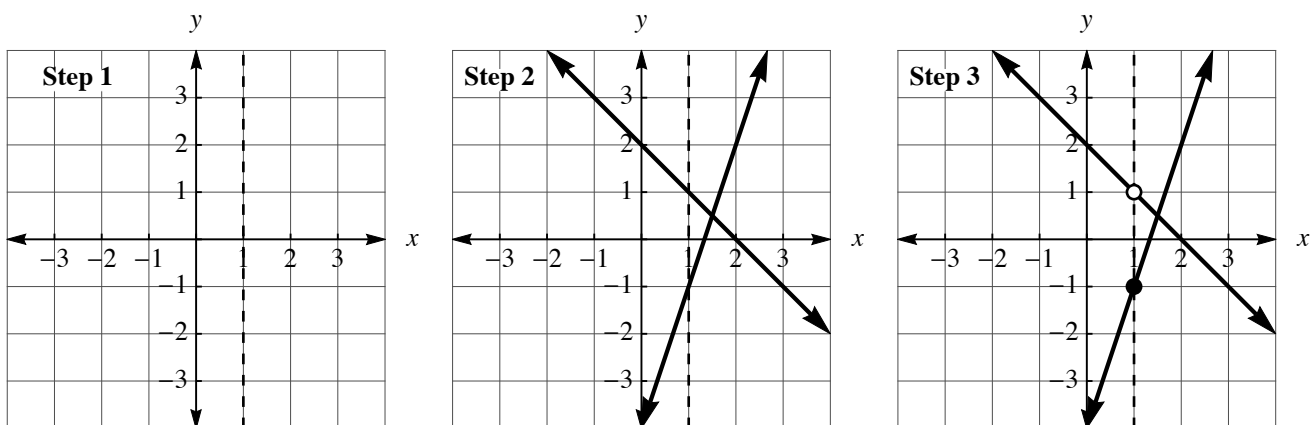
The second ray does own the fence (its x condition does have the equal sign), so its point on the fence is shown as a closed circle. The y -value for that coordinate point is:

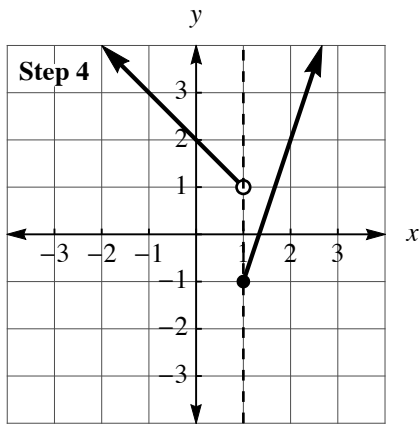
$$\begin{aligned} y &= 3x - 4 \\ y &= 3(1) - 4 \\ y &= -1 \end{aligned}$$

These points are shown in Step 3, below.

Step 4: Clean Up

The first ray is to the left of the fence and the second ray is to the right of the fence, as shown in Step 4, below.





Example 2

In this example, we will graph a piecewise function that has 3 parts and therefore two fences.

$$f(x) = \begin{cases} x + 1 & x < -2 \\ 3 & -2 \leq x < 1 \\ -2x + 4 & x \geq 1 \end{cases}$$

Step 1: Draw the Fences

The fences are at $x = -2$ and $x = 1$ (see Step 1, below).

Step 2: Graph the First Two Functions as Lines

To keep things simple (“Start Small”), we’re going to first focus on the first two functions, which is very similar to the previous example (see Step 2, below).

Step 3: Put the Points on the First Fence

The y-coordinate value for the first function is

$$y = x + 1 \implies y = (-2) + 1 = -1$$

The y-coordinate value for the second function is just $y = 3$ (since we are dealing with a horizontal line). The second function owns the first fence. These points are shown in Step 3, below.

Step 4: Clean Up the First Two Functions

The first ray is to the left of the fence and the second ray is to the right of the fence, as shown in Step 4, below.

Step 5: Draw the Third Function as a Line

See Step 5, below.

Step 6: Put the Points on the Second Fence

The y-coordinate value for the third function is

$$y = -2x + 4 \implies y = -2(1) + 4 = -2 + 4 = -2$$

The y-coordinate value for the second function is still $y = 3$ (since we are still dealing with a horizontal line). The third function owns the second fence. These points are shown in Step 6, below.

Step 7: Clean Up the Functions

The horizontal ray is to the left of the second fence and the third ray is to the right of the second fence, as shown in Step 7, below.

