

Exercise 72

- a. Graph the functions $f(x) = 3/(x-1)$ and $g(x) = 2/(x+1)$ together to identify the values of x for which

$$\frac{3}{x-1} < \frac{2}{x+1}.$$

- b. Confirm your findings in part (a) algebraically.

Solution

The aim is to find the values of x for which $f(x) < g(x)$.

$$f(x) < g(x)$$

$$\frac{3}{x-1} < \frac{2}{x+1}$$

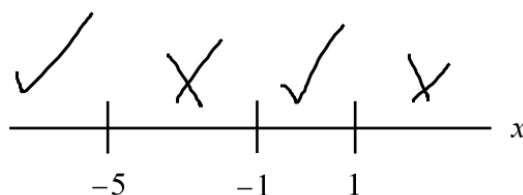
$$\frac{3}{x-1} - \frac{2}{x+1} < 0$$

$$\frac{3(x+1)}{(x-1)(x+1)} - \frac{2(x-1)}{(x-1)(x+1)} < 0$$

$$\frac{3(x+1) - 2(x-1)}{(x-1)(x+1)} < 0$$

$$\frac{x+5}{(x-1)(x+1)} < 0 \tag{1}$$

The critical points are $x = -5$, $x = -1$, and $x = 1$. Partition the number line at these values of x and test a number within each interval to see if inequality (1) is true or false.



Therefore, the values of x for which $f(x) < g(x)$ are

$$\{x \mid x < -5, -1 < x < 1\}.$$

This is confirmed in the graph of the two functions versus x .

