

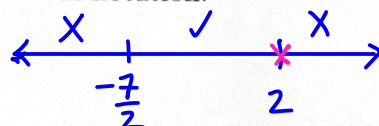
Name: Solutions

1. Solve the inequality

$$\frac{3x+5}{x-2} \leq 1$$

and write your answer in interval notation.

$$\frac{3x+5}{x-2} \leq 1 \quad \begin{array}{l} * \text{ I would} \\ \text{not try to} \\ \text{cross multiply} \\ \text{here} \end{array}$$



$$\frac{3x+5}{x-2} - 1 \leq 0$$

$$x = -4 : \frac{2(-4)+7}{(-4)-2} = \frac{-8+7}{-6} = \frac{-1}{-6} = \frac{1}{6} \leq 0? \text{ No.}$$

$$\frac{3x+5-1(x-2)}{x-2} \leq 0$$

$$x = 0 : \frac{2(0)+7}{0-2} = -\frac{7}{2} \leq 0? \text{ Yes!}$$

$$\frac{3x+5-x+2}{x-2} \leq 0$$

$$x = 3 : \frac{2(3)+7}{3-2} = \frac{13}{1} = 13 \leq 0? \text{ No.}$$

$$\frac{2x+7}{x-2} \leq 0$$

top can be 0, no problems here

bottom never allowed to be 0

top:
 $2x+7=0$
 $x=-7/2$

bottom:
 $x-2=0$
 $x=2$

$$[-7/2, 2)$$

2. Let

$$f(x) = \ln(x+3), \quad g(x) = x$$

Find the domain of $(\frac{f}{g})(x)$.

$$\text{Domain of } f(x): f(x) = \ln(x+3)$$

$$x+3 > 0$$

$$\rightarrow$$

$$\begin{array}{l} x+3 > 0 \\ x > -3 \\ (-3, \infty) \end{array}$$

Domain of $g(x)$: $g(x) = x$; $\mathbb{R}$ (all real numbers)

$$\left(\frac{f}{g}\right)(x) = \frac{\ln(x+3)}{x} \quad \leftarrow \begin{array}{l} x \neq 0 \text{ and} \\ x > -3 \end{array}$$

$$\Rightarrow (-3, 0) \cup (0, \infty)$$