(2) Find the Domain of Sum, Difference, Product and Quotient of 2 functions.

Suppose that we are given 2 functions f and g.

The domain of f is D_f

The domain of g is D_g

To find the domain of $f+g$; $f-g$; $f \cdot g$, we just need to find the intersection between the domain of f and the domain of g.

In mathematical notation:

$$\text{Domain of } f+g = D_f \cap D_g$$

Domain of $f-g = D_f \cap D_g$

Domain of $f \cdot g = D_f \cap D_g$

E.g. $f(x) = \frac{5}{4-x}$; $g(x) = \frac{x}{2x+3}$.

Q: Find the domain of $f+g$, $f-g$ and $f \cdot g$?

Strategy: Find D_f. Find D_g. Find $D_f \cap D_g$.

Step 1: Find D_f.

$4 - x = 0 \rightarrow x = 4$.

D_f = all real #s except for 4

$= (-\infty, 4) \cup (4, \infty)$

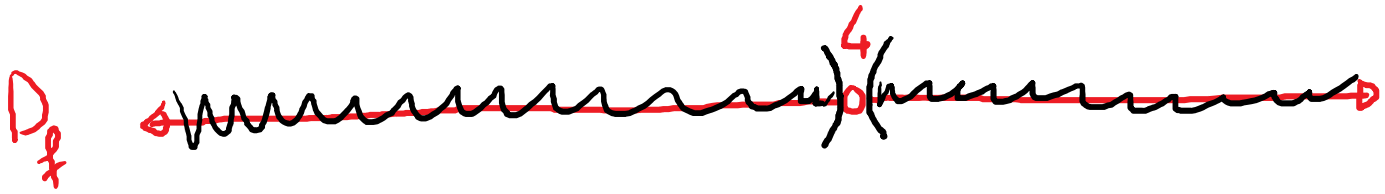
Step 2: Find D_g

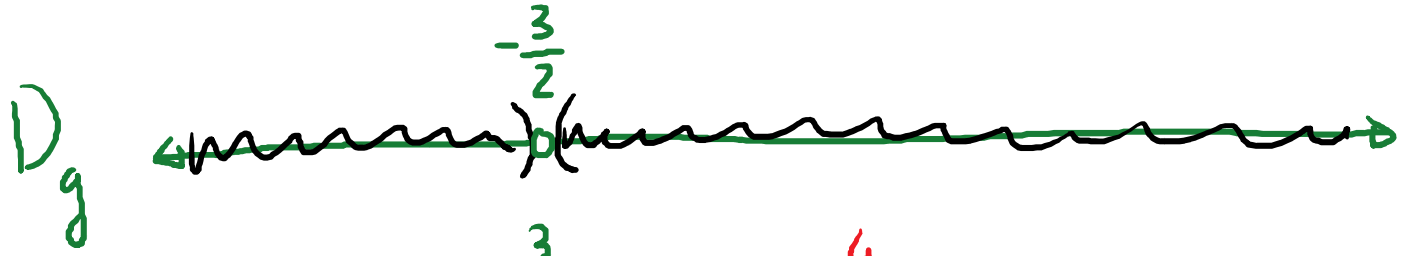
$$2x+3=0 \leftrightarrow 2x=-3 \leftrightarrow x=-\frac{3}{2}$$

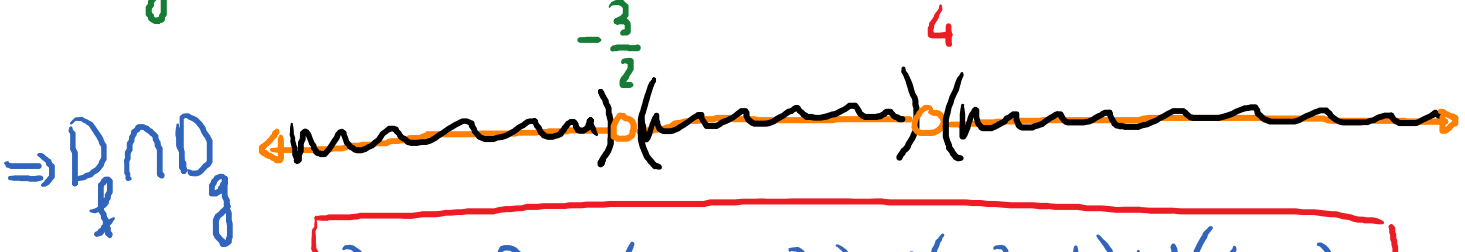
D_g = all real #s except for $-\frac{3}{2}$

$$= \left(-\infty, -\frac{3}{2}\right) \cup \left(-\frac{3}{2}, \infty\right)$$

Step 3: Find $D_f \cap D_g$







$$D_f \cap D_g = \left(-\infty, -\frac{3}{2}\right) \cup \left(-\frac{3}{2}, 4\right) \cup (4, \infty)$$

* How to find the domain of $\frac{f}{g}$?

Process: Step 1: Find D_f. Step 2: Find D_g

Step 3: Find $D_f \cap D_g$

Step 4: Find any values of x for which $g(x) = 0$

Step 5: Conclusion: the domain of $\frac{f}{g}$ will be the set in Step 3 excluding any values of x found in Step 4.

E.g. $f(x) = \frac{3}{x-5}$; $g(x) = x + 7$.

Q: Find the domain of $\frac{f}{g}$?

Step 1: Find D_f

$$D_f = (-\infty, 5) \cup (5, \infty)$$

Step 2: Find D_g

$$D_g = (-\infty, \infty)$$

Step 3: Find $D_f \cap D_g$

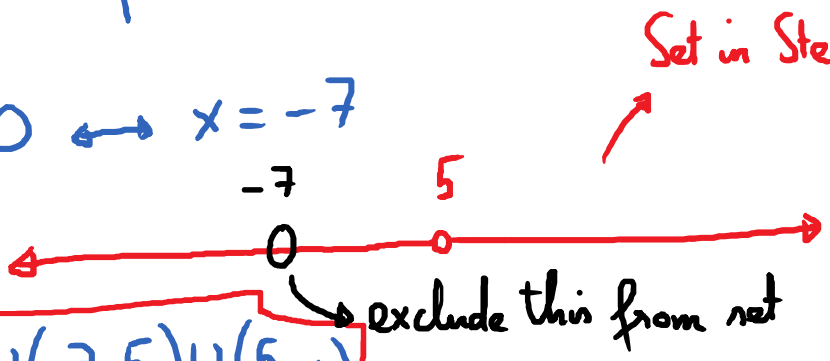
$$D_f \cap D_g = (-\infty, 5) \cup (5, \infty)$$

Step 4: Find all values of x for which $g(x) = 0$.

Take $g(x)$ and set it equal to 0 and solve for x.

$$x + 7 = 0 \longleftrightarrow x = -7$$

Step 5: Conclusion.



Domain = $\boxed{(-\infty, -7) \cup (-7, 5) \cup (5, \infty)}$