(2) $f(a) = 2a - 1$ ; $g(a) = a + 4$

$(f \cdot g)(a) = f(a) \cdot g(a) = (2a - 1) \cdot (a + 4)$

$= 2a^2 + 8a - a - 4$

$$\boxed{(f \cdot g)(a) = 2a^2 + 7a - 4}$$

(3) $u(3) = 2 - (3)^2 = -7$ ; $v(3) = 3 - 1 = 2$

$$\left(\frac{u}{v}\right)(3) = \boxed{\frac{-7}{2}}.$$

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

Suppose we are given the functions $f$ and $g$.

The domain of $f$ is $D_f$

The domain of $g$ is $D_g$

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

In mathematical notation,

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

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

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

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

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

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

* Find $D_f$.

$4 - x = 0 \longrightarrow x = 4$

$D_f$ = all real #s except for 4

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

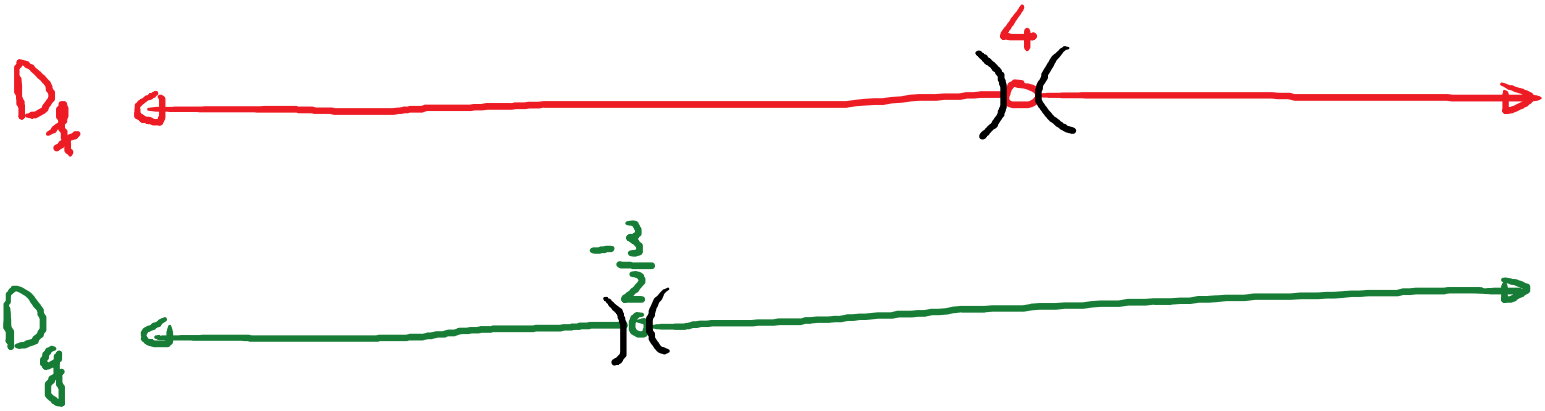
* Find $D_g$

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

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

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

* Find $D_f \cap D_g$



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

* To find the domain of $\frac{f}{g}$, we do the following

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: 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 $D_g$

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

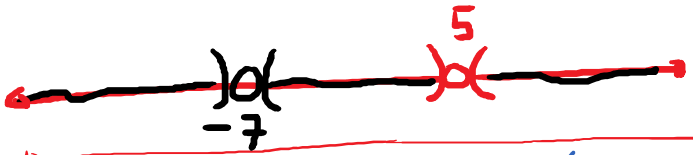
Step 3: Find $D_f \cap D_g$

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

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

$$g(x) = 0 \iff x + 7 = 0 \iff x = -7$$

Step 5: Conclusion




Domain of $\frac{f}{g}$ = $(-\infty, -7) \cup (-7, 5) \cup (5, \infty)$