

• **Review of Intersection and Union of two sets:**

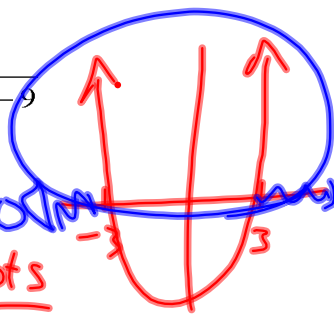
$$f(x) = \sqrt{x+4}$$

$$g(x) = \sqrt{x^2-9}$$

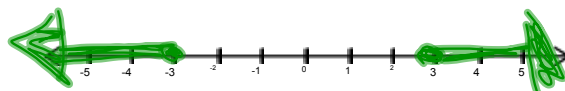
Let A represent the domain of f and B the domain of g .

$$A: \begin{aligned} x+4 &\geq 0 \\ x &\geq -4 \end{aligned}$$

$$B: \begin{aligned} x^2-9 &\geq 0 \\ \text{x-Intercepts} \\ x^2-9 &= 0 \\ (x-3)(x+3) &= 0 \\ x &= \pm 3 \end{aligned}$$



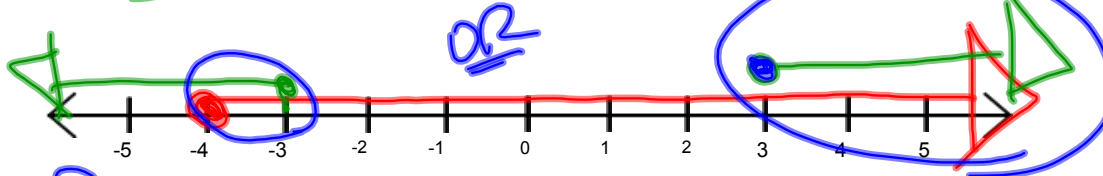
$$\begin{aligned} x &\leq -3 \\ \text{OR} \\ x &\geq 3 \end{aligned}$$



I. Intersection:

$$A \cap B$$

(Overlap)

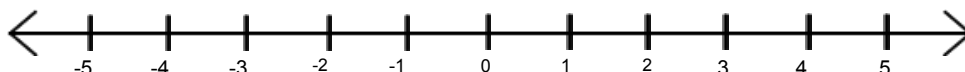


$$\begin{aligned} \{ -4 \leq x \leq -3 \quad \text{OR} \quad x \geq 3, x \in \mathbb{R} \} \\ [-4, -3] \quad [3, \infty) \end{aligned}$$

II. Union:

$$A \cup B$$

$$\{x \in \mathbb{R}\}$$



Example

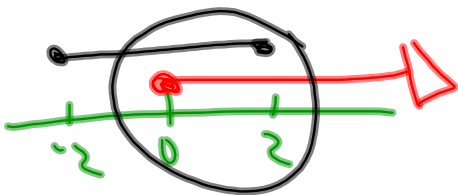
- If $f(x) = \sqrt{x}$ and $g(x) = \sqrt{4-x^2}$, find the functions $f+g$, $f-g$, fg , and f/g .

**Also examine the domain of each of these new functions

$$\left. \begin{aligned} (f+g)(x) &= f(x) + g(x) \\ &= \sqrt{x} + \sqrt{4-x^2} \end{aligned} \right\} \text{D: } [0, 2]$$

$$f(x) = \sqrt{x}$$

Domain: $x \geq 0$



$$0 \leq x \leq 2$$

$$g(x) = \sqrt{4-x^2}$$

Domain: $4-x^2 \geq 0$ Above x-axis

$$4-x^2 = 0$$

$$(2-x)(2+x) = 0$$

$$x = \pm 2$$

$$-2 \leq x \leq 2$$

