

## DOMAIN OF A FUNCTION.

$$f(x) = \frac{1}{x} \quad f(x) = \sqrt{x}$$

$$\text{Dom}(f) = \{x \mid x \neq 0\}$$

$$\text{Dom}(f) = [0, +\infty)$$

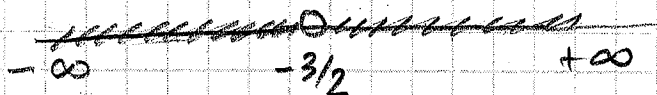
$$\text{EX: } f(x) = \frac{2x+3}{2x+3}$$

oops, the numerator was supposed to be  $2x-3$

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

$$\text{Dom}(f) = \{x \mid x \neq -3/2\}$$

$$= (-\infty, -3/2) \cup (-3/2, +\infty)$$



$$\text{EX: } f(x) = \frac{x+5}{x^2+5x+6}$$

$$x^2+5x+6=0$$

Factor  
 $\bullet = 6$      $2, 3$   
 $+ = 5$

quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

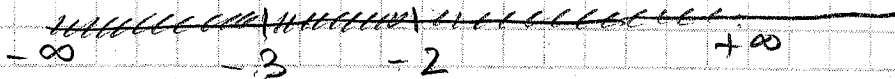
$$(x+2)(x+3) = 0 \Rightarrow x+2=0 \text{ or } x+3=0$$

$$a \cdot b = 0 \Rightarrow a=0 \text{ or } b=0$$

$$x = -2 \quad x = -3$$

$$\text{Dom}(f) = \{x \mid x \neq -2, -3\}$$

$$= (-\infty, -3) \cup (-3, -2) \cup (-2, +\infty)$$



$$\text{EX: } f(x) = \frac{4x^2}{25-x^2}$$

$$\text{EX: } f(x) = \frac{x+5}{x(x+1)(x-2)}$$

$$\text{EX: } f(x) = \frac{2x+3}{x^2+x+1}$$

$$x^2+x+1=0$$

$$\begin{array}{l} \Delta = 1^2 - 4 \cdot 1 \cdot 1 = -3 < 0 \\ \text{no solution} \end{array}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1 \pm \sqrt{1 - 4 \cdot 1 \cdot 1}}{2 \cdot 1}$$

Domain = all real numbers =  $(-\infty, \infty) = \mathbb{R}$

$$\text{EX: } f(x) = \frac{2}{x^2+1}$$

$$\text{EX: } f(x) = \frac{2}{x^2-1}$$

$$x^2+1=0 \Rightarrow x^2=-1 \text{ (oops!)}$$

$$\text{DOM} = \mathbb{R} = (-\infty, +\infty)$$

$$x^2-1=0 \Rightarrow (x+1)(x-1)=0$$

$$x=-1 \quad x=1$$

$$\text{DOM} = \{x \mid x \neq -1, 1\}$$

$$\text{EX: } f(x) = \frac{3}{|x+5|-1}$$

$$|x|=a \Rightarrow \begin{array}{l} x=a \\ x=-a \end{array}$$

$$|x+5|-1=0 \Rightarrow |x+5|=1 \Rightarrow$$

$$\Rightarrow x+5=1 \quad \text{or} \quad x+5=-1$$

$$x=-4$$

$$x=-6$$

$$\text{DOM} = \{x \mid x \neq -4, -6\}$$

$$= (-\infty, -6) \cup (-6, -4) \cup (-4, +\infty)$$

