

## Domain and Range Algebraically

What is the domain of the following functions:

1.  $f(x) = x^2 + 7$

$(-\infty, \infty)$

2.  $f(x) = |2x + 10| - 7$

$(-\infty, \infty)$

3.  $f(x) = \sqrt{2x - 4}$

$$\begin{aligned} 2x - 4 &\geq 0 \\ +4 & \quad +4 \\ \hline 2x &\geq 4 \\ \frac{2x}{2} & \geq \frac{4}{2} \end{aligned}$$

$\rightarrow x \geq 2$

4.  $g(x) = \sqrt{3x + 12}$

$$\begin{aligned} 3x + 12 &\geq 0 \\ -12 & \quad -12 \\ \hline 3x &\geq -12 \\ \frac{3x}{3} & \geq \frac{-12}{3} \\ x &\geq -4 \end{aligned}$$

5.  $f(x) = -2\sqrt{12 - 6x} + 1$

$$\begin{aligned} 12 - 6x &\geq 0 \\ -12 & \quad -12 \\ \hline -6x &\geq -12 \\ \frac{-6x}{-6} & \geq \frac{-12}{-6} \\ x &\leq 2 \end{aligned}$$

Switch the inequality when dividing by a negative

6.  $j(x) = 3\sqrt{7 - 2x} + 4$

$$\begin{aligned} 7 - 2x &\geq 0 \\ -7 & \quad -7 \\ \hline -2x &\geq -7 \\ \frac{-2x}{-2} & \geq \frac{-7}{-2} \\ x &\leq 3.5 \end{aligned}$$

7.  $f(x) = \frac{x}{7x - 28}$

$x \neq 4$

$$\begin{aligned} 7x - 28 &= 0 \\ +28 & \quad +28 \\ \hline 7x &= 28 \\ \frac{7x}{7} & \quad \frac{28}{7} \\ x &= 4 \end{aligned}$$

8.  $g(x) = \frac{9}{2x + 18}$

$$\begin{aligned} 2x + 18 &= 0 \\ -18 & \quad -18 \\ \hline 2x &= -18 \\ \frac{2x}{2} & \quad \frac{-18}{2} \\ x &= -9 \end{aligned}$$

$x \neq -9$

$$9. f(x) = \frac{x-8}{x^2+8x+12}$$

$$x^2+8x+12=0$$

$$(x+6)(x+2)=0$$

$$x=-6 \quad x=-2$$

$$x | x \neq -6, -2$$

$$11. p(x) = \frac{x-8}{\sqrt{2x-12}} + 8$$

$$2x-12 > 0$$

$$+12 \quad +12$$

$$\frac{2x}{2} > \frac{12}{2}$$

$$x > 6$$

$$13. f(x) = \frac{x-6}{\sqrt{7x-21}} + 5$$

$$7x-21 > 0$$

$$+21 \quad +21$$

$$\frac{7x}{7} > \frac{21}{7}$$

$$x > 3$$

$$10. p(x) = \frac{x^2+5x-6}{x^2-5x+6}$$

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

$$(x-3)(x+2)=0$$

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

$$x | x \neq 2, 3$$

$$12. q(x) = \frac{14}{\sqrt{4x+12}} + 8$$

$$4x+12 > 0$$

$$-12 \quad -12$$

$$\frac{4x}{4} > \frac{-12}{4}$$

$$x > -3$$

$$14. g(x) = \frac{x+4}{\sqrt{2x+10}} - x$$

$$2x+10 > 0$$

$$-10 \quad -10$$

$$\frac{2x}{2} > \frac{-10}{2}$$

$$x > -5$$

$$15. f(x) = 2\sqrt{x^2+5x-14} + 3$$

$$x^2+5x-14 \geq 0 \text{ divergent}$$

$$(x+7)(x-2)=0$$

$$x=-7 \quad x=2$$



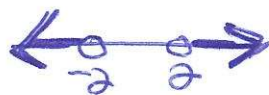
$$x \leq -7 \text{ or } x \geq 2$$

$$16. n(x) = \frac{x+4}{\sqrt{x^2-4}} - 8$$

$$x^2-4 > 0 \text{ divergent}$$

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

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



$$x < -2 \text{ or } x > 2$$