

Exercise 2

In Exercises 1 and 2, find the domains of f , g , $f + g$, and $f \cdot g$.

$$f(x) = \sqrt{x+1}, \quad g(x) = \sqrt{x-1}$$

Solution

The domain of $f(x) = \sqrt{x+1}$ is

$$x + 1 \geq 0$$

$$x \geq -1$$

$$\{x \mid x \geq -1\},$$

the domain of $g(x) = \sqrt{x-1}$ is

$$x - 1 \geq 0$$

$$x \geq 1$$

$$\{x \mid x \geq 1\},$$

the domain of $f(x) + g(x) = \sqrt{x+1} + \sqrt{x-1}$ is

$$x + 1 \geq 0 \quad \text{and} \quad x - 1 \geq 0$$

$$x \geq -1 \quad \text{and} \quad x \geq 1$$

$$\{x \mid x \geq 1\},$$

and the domain of $f(x)g(x) = \sqrt{x+1}\sqrt{x-1} = \sqrt{(x+1)(x-1)} = \sqrt{x^2-1}$ is

$$x^2 - 1 \geq 0$$

$$x^2 \geq 1$$

$$x \leq -1 \quad \text{or} \quad x \geq 1$$

$$\{x \mid x \leq -1, x \geq 1\}.$$