Exercise 4

In Exercises 3 and 4, find the domains of f, g, f/g, and g/f.

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

Solution

Any number can be plugged in for x to the formula for f, as it's a constant function. This means the domain of f is $(-\infty, \infty)$. g has a square root function, and only the square root of a nonnegative number can be taken.

$$x \geq 0$$

The domain of g is then $[0, \infty)$. The ratio f/g is

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

which has a square root function and a denominator.

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

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

No real value of x satisfies the inequality on the left, so this condition can be ignored. The domain of f/g is $[0, \infty)$. The ratio g/f is

$$\frac{g(x)}{f(x)} = \frac{1 + \sqrt{x}}{1} = 1 + \sqrt{x}.$$

Its domain is the same as g: $[0, \infty)$.