Exercise 3

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

$$f(x) = 2, \quad g(x) = x^2 + 1$$

Solution

Any number can be plugged in for x to the formulas for f and g, as they're polynomial functions. This means the domain of f and the domain of g are $(-\infty, \infty)$. The ratio f/g is

$$\frac{f(x)}{g(x)} = \frac{2}{x^2 + 1}.$$

This is a rational function, and the denominator cannot be zero.

$$x^2 + 1 \neq 0$$

$$x^2 \neq -1$$

No value of x satisfies this inequality, so any value of x can be plugged into f/g. Its domain is $(-\infty, \infty)$. The ratio g/f is

$$\frac{g(x)}{f(x)} = \frac{x^2 + 1}{2} = \frac{1}{2}(x^2 + 1) = \frac{1}{2}x^2 + \frac{1}{2},$$

which is another polynomial function. Its domain is $(-\infty, \infty)$ because any number can be plugged in for x.