

Exercise 26

Explain, using Theorems 4, 5, 7, and 9, why the function is continuous at every number in its domain. State the domain.

$$G(x) = \frac{x^2 + 1}{2x^2 - x - 1}$$

Solution

$G(x)$ is a rational function, and according to Theorem 5 all rational functions are continuous wherever they are defined. The denominator cannot be zero.

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

$$(2x + 1)(x - 1) \neq 0$$

$$2x + 1 \neq 0 \quad \text{or} \quad x - 1 \neq 0$$

$$x \neq -\frac{1}{2} \quad \text{or} \quad x \neq 1$$

Therefore, the domain of $G(x)$ is

$$\left(-\infty, -\frac{1}{2}\right) \cup \left(-\frac{1}{2}, 1\right) \cup (1, \infty).$$