Exercise 30

Find the critical numbers of the function.

$$f(x) = x^3 + 6x^2 - 15x$$

Solution

A critical number is a value of x for which the derivative is zero or nonexistent. Take the derivative of the function.

$$\begin{aligned} f'(x) &= \frac{d}{dx}(x^3 + 6x^2 - 15x) \\ &= (3x^2) + 6(2x) - 15(1) \\ &= 3x^2 + 12x - 15 \end{aligned}$$

Set $f'(x) = 0$ and solve for x.

$$\begin{gathered} f'(x) = 0 \\ 3x^2 + 12x - 15 = 0 \\ 3(x^2 + 4x - 5) = 0 \\ 3(x + 5)(x - 1) = 0 \\ x = -5 \quad \text{or} \quad x = 1 \end{gathered}$$