

Exercise 31

Find the critical numbers of the function.

$$f(x) = 2x^3 - 3x^2 - 36x$$

Solution

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

$$\begin{aligned} f'(x) &= \frac{d}{dx}(2x^3 - 3x^2 - 36x) \\ &= 2(3x^2) - 3(2x) - 36(1) \\ &= 6x^2 - 6x - 36 \end{aligned}$$

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

$$\begin{aligned} f'(x) &= 0 \\ 6x^2 - 6x - 36 &= 0 \\ 6(x^2 - x - 6) &= 0 \\ 6(x - 3)(x + 2) &= 0 \\ x = 3 \quad \text{or} \quad x = -2 \end{aligned}$$