

Exercise 38

Find the critical numbers of the function.

$$g(x) = \sqrt[3]{4 - x^2}$$

Solution

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

$$\begin{aligned} g'(x) &= \frac{d}{dx} \sqrt[3]{4 - x^2} \\ &= \frac{1}{3}(4 - x^2)^{-2/3} \cdot \frac{d}{dx}(4 - x^2) \\ &= \frac{1}{3}(4 - x^2)^{-2/3} \cdot (-2x) \\ &= -\frac{2x}{3(4 - x^2)^{2/3}} \end{aligned}$$

Set what's in the numerator and denominator equal to zero and solve for x .

$$2x = 0$$

$$x = 0$$

$$3(4 - x^2)^{2/3} = 0$$

$$4 - x^2 = 0$$

$$x = 2 \quad \text{or} \quad x = -2$$