

**Problem Definition**

Problem 39. Compute the derivative of the following function.

$$f(x) = (x + 4)(2x^2 - 1)$$

**Solution Step 1:**

First, we will need to expand the terms out to end up with a polynomial. The algebra is done as follows.

$$f(x) = (x + 4)(2x^2 - 1) = 2x^3 - x + 8x^2 - 4 = 2x^3 + 8x^2 - x - 4$$

**Solution Step 2:**

Now compute the derivative of the function using the properties of derivatives.

$$\begin{aligned} f'(x) &= \frac{d}{dx}(2x^3 + 8x^2 - x - 4) \\ &= 2\frac{d}{dx}x^3 + \frac{d}{dx}(8x^2) - \frac{d}{dx}x - \frac{d}{dx}4 \\ &= 6x^2 + 16x - 1 - 0 \\ &= 6x^2 + 16x - 1 \end{aligned}$$