

**Problem Definition**

Problem 29. Find the higher order derivative from the given derivative.

$$f''(x) = \frac{(2x - 2)}{x} \quad f'''(x)$$

**Solution Step 1:**

The third derivative of the function is the first derivative of the second derivative given above. The calculation is

$$\begin{aligned} f'''(x) &= \frac{d}{dx} f''(x) \\ &= \frac{d}{dx} \frac{(2x - 2)}{x} \\ &= \frac{d}{dx} 2 - 2x^{-1} \\ &= 0 - 2(-1)x^{-2} = 2x^{-2} = \frac{2}{x^2} \end{aligned}$$