**5.1** Compute the derivative f'(x) for

$$f(x) = log(x^4)sin(x^3)$$

Solution.

$$f(x) = \log(x^4) \sin(x^3)$$

$$= f(x) = 4log(x)sin(x^3)$$

Using Product rule,

$$f'(x) = sin(x^3)(\frac{d(4log(x))}{dx}) + 4log(x)(\frac{dsin(x^3)}{dx})$$

Now applying Chain rule,

$$f'(x) = sin(x^3) \left( \frac{d(4log(x))}{d(log(x))} * \frac{d(log(x))}{d(x)} \right) + 4log(x) \left( \frac{dsin(x^3)}{d(x^3)} * \frac{d(x^3)}{dx} \right)$$

$$f'(x) = sin(x^3) \left(4 * \frac{1}{x}\right) + 4log(x) \left(cos(x^3) * 3x^2\right)$$

$$f'(x) = \frac{4sin(x^3)}{x} + 12x^2log(x)cos(x^3)$$