Name: _____

Calculators are not allowed!

1. Find the derivative of
$$f(x) = \frac{3}{x^3} + \frac{2}{x^4} + \sqrt{x}.$$

2. Find the derivative of
$$f(x) = x^2 \sqrt[4]{8x^2 - 3}.$$

Solutions to Quiz #4

1. Use the sum, coefficient, and power rules as follows:

$$\frac{df}{dx} = \frac{d}{dx}\left(\frac{3}{x^3} + \frac{2}{x^4} + \sqrt{x}\right)$$

$$= 3\frac{d}{dx}(x^{-3}) + 2\frac{d}{dx}(x^{-4}) + \frac{d}{dx}(x^{1/2})$$

$$= 3(-3)(x^{-3-1}) + 2(-4)(x^{-4-1}) + (1/2)x^{1/2-1}$$

$$= -9x^{-4} - 8x^{-5} + (1/2)x^{-1/2}$$

$$= -\frac{9}{x^4} - \frac{8}{x^5} + \frac{1}{2\sqrt{x}}.$$

2. Use the product rule with $u(x) = x^2$ and

$$v(x) = \sqrt[4]{8x^2 - 3} = (8x^2 - 3)^{1/4}.$$

Compute $u'(x) = 2x$ and

$$v'(x) = (1/4)(8x^2 - 3)^{1/4-1}\frac{d}{dx}(8x^2 - 3)$$

$$= (1/4)(8x^2 - 3)^{-3/4}(16x)$$

$$= 4(8x^2 - 3)^{-3/4}.$$

So

$$f'(x) = u(x)v'(x) + u'(x)v(x)$$

$$= (x^2)(4)(8x^2 - 3)^{-3/4} + (2x)(8x^2 - 3)^{1/4}$$

$$= \frac{4x^2}{(8x^2 - 3)^{3/4}} + 2x(8x^2 - 3)^{1/4}$$

$$= \frac{4x^2}{\sqrt[4]{(8x^2 - 3)^3}} + 2x\sqrt[4]{8x^2 - 3}.$$