

# Math 2143 - Brief Calculus with Applications

Quiz #4 - 2008.02.19

Solutions

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Compute the following derivatives:

1.

$$\frac{d}{dx} \left[ \left( 2x^2 - 3x + \frac{4}{\sqrt{x}} \right) \cdot (\sqrt{x} - 4x + 2) \right]$$

We set  $f(x) = 2x^2 - 3x + \frac{4}{\sqrt{x}}$  and  $g(x) = \sqrt{x} - 4x + 2$ . We compute the derivatives of  $f(x)$  and  $g(x)$  and get

$$f'(x) = 4x - 3 - 2x^{-\frac{3}{2}}, \quad g'(x) = \frac{1}{2\sqrt{x}} - 4$$

Plugging these into the product rule gives

$$\frac{d}{dx} \left[ \left( 2x^2 - 3x + \frac{4}{\sqrt{x}} \right) \cdot (\sqrt{x} - 4x + 2) \right] = (4x - 3 - 2x^{-\frac{3}{2}}) (\sqrt{x} - 4x + 2) + \left( 2x^2 - 3x + \frac{4}{\sqrt{x}} \right) \left( \frac{1}{2\sqrt{x}} - 4 \right)$$

2.

$$\frac{d}{dx} \frac{2x^2 - 3x + \frac{4}{\sqrt{x}}}{\sqrt{x} - 4x + 2}$$

Notice that  $f(x)$  and  $g(x)$  are the same as in problem 1, so we just plug them into the quotient rule:

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