Worksheet: Section 3.2 (Product Rule and Quotient Rule)

1. Complete The Product Rule: If f and g are differentiable, then

$$\frac{d}{dx}[f(x)g(x)]] =$$

2. Complete The Quotient Rule: If f and g are differentiable, then

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] =$$

3. Find the derivatives for each function below. Do not use the Product Rule or the Quotient Rule if you don't have to!

   (a) $f(x) = 5x^3 e^x$

   (b) $f(x) = \dfrac{2x^2 - 5}{4 - x}$
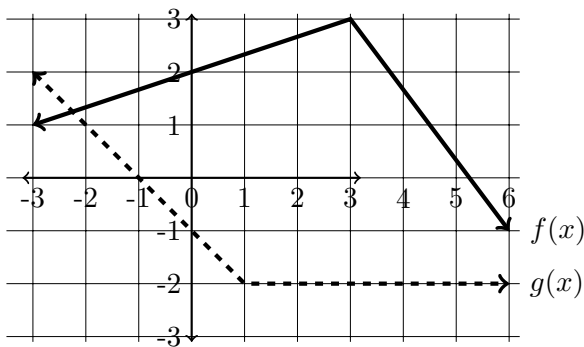
   (c) $f(x) = (1 - x^2)(e^x + x)$

   (d) $g(x) = \dfrac{\sqrt{x}}{8}(1 - x\sqrt{x})$

(e) $h(x) = \dfrac{10x - x^{3/2}}{4x^2}$ (Avoid the quotient rule!)

(f) $y = \dfrac{\sqrt[3]{x}}{2x + 1}$

(g) $v(t) = \dfrac{2te^t}{t^2 + 1}$

4. The graphs of $f(x)$ (shown thick) and the graphs of $g(x)$ (shown dashed) are shown below. If $h(x) = f(x)g(x)$, find $h'(0)$.

5. Suppose that $f(5) = 1$, $f'(5) = 6$, $g(5) = -3$ and $g'(5) = 2$. Find the following values.

(a) $(f - g)'(5)$ (b) $(fg)'(5)$ (c) $(g/f)'(5)$