MA1125 – Calculus
Tutorial problems #4

1. Compute the derivative $y' = \frac{dy}{dx}$ in each of the following cases.

$$y = \ln(\sec x) + e^{\tan x}, \qquad y = \sin(\sec^2(4x)).$$

2. Compute the derivative $y' = \frac{dy}{dx}$ in the case that $x^2 \sin y = y^2 e^x$.

3. Compute the derivative $y' = \frac{dy}{dx}$ in each of the following cases.

$$y = x^2 \cdot \tan^{-1}(2x), \qquad y = (x \cdot \sin x)^x.$$

4. Compute the derivative $f'(x_0)$ in the case that

$$f(x) = \frac{(x^3 + 5x^2 + 2)^3 \cdot e^{\sin x}}{\sqrt{x^2 + 4x + 1}}, \qquad x_0 = 0.$$

5. Compute the derivative $y' = \frac{dy}{dx}$ in the case that

$$y = \sin^{-1} u, \qquad u = \ln(2z^2 + 3z + 1), \qquad z = \frac{3x - 1}{2x + 5}.$$

6. Compute the derivative $y' = \frac{dy}{dx}$ in each of the following cases.

$$y = (e^{2x} + x^3)^4, \qquad y = \tan(x \sin x).$$

7. Compute the derivative $y' = \frac{dy}{dx}$ in the case that $x^2 + y^2 = \sin(xy)$.

8. Compute the derivative $f'(x_0)$ in the case that

$$f(x) = \frac{(x^2 + 3x + 1)^4 \cdot \sqrt{2x + \cos x}}{(e^x + x)^3}, \qquad x_0 = 0.$$

9. Compute the derivative $y' = \frac{dy}{dx}$ in the case that

$$y = \frac{2u - 1}{3u + 1}, \qquad u = \sin(e^z), \qquad z = \tan^{-1}(x^2).$$

10. Compute the derivative $f'(1)$ in the case that $x^2 f(x) + x f(x)^3 = 2$ for all x.