MATH1003
ASSIGNMENT 5

Suggested practice questions (the answers are in the back of the textbook):

- §*3.3; 1, 3, 9, 13, 17, 18, 19.*
- §*3.4; 1, 3, 5, 7, 17, 19, 23, 33, 47.*

1. Differentiate the following functions:

    (i) $y = \sec x$,

    (ii) $y = \dfrac{x^2}{\cos x}$,

    (iii) $y = \sec x(x - \cot x)$,

    (iv) $y = \sin(\sin(\sin x))$,

    (v) $y = \dfrac{(\csc x)^4}{2x^2}$.

2. Let $y = \sin 2x - 2\sin x$. For what values of x is the tangent line parallel to the x-axis?

3. Suppose that f is differentiable on $\mathbb{R}$. Given F as follows, find an expression for F'.

    (i) $F(x) = f(e^x)$,
    (ii) $F(x) = e^{f(x)}$,
    (iii) $F(x) = f(x^\alpha)$,
    (iv) $F(x) = f(x)^\alpha$.

4. Let $y = e^{-rx}$, where r is a constant.
    (i) Find expressions for y' and y'' in terms of y and r.
    (ii) Show that the following equation is satisfied:

$$y'' + 2ry' + r^2y = 0.$$

    (iii) Write down a function which satisfies:

$$y'' - 6y' + 9y = 18.$$