3 October 2014 **Derivatives of Trig Functions**

(1) Differentiate the following functions.

(a) $f(x) = 2\sec(3x) - \csc(7x)$

(b) $g(t) = \dfrac{\cot(2t)}{e^t}$

(c) $k(y) = \dfrac{y\cos y}{1+y}$

(d) $G(\theta) = \sin^2(5\theta)$

(2) (a) Use the Quotient rule to differentiate the function

$$f(x) = \frac{\tan x - 1}{\sec x}$$

(b) Simplify $f(x)$ by writing everything in terms of $\sin x$ and $\cos x$. Now find $f'(x)$.

(c) Make sure your answers in (a) and (b) are the same.

(3) Suppose $f(x) = \sin x$. Find $f^{(173)}(x)$. (Hint: write out the first 5 derivatives of $f(x)$.) Now do the same for $g(x) = x \sin x$.

(4) For each function below, find the values of x for which $f(x)$ has a horizontal tangent.

(a) $f(x) = x + 2\sin x$

(b) $g(x) = e^x \cos x$