# MA1300 Self Practice # 12

**1**. (P402, #49, 50; P418, #3, 12; P419, #49, 52; P460, #25, 26, 29; P468, #33, 35) Find the derivative of the function.

$$
\begin{gathered}
\text{(a).}\ \ y = \cos\left(\frac{1-e^{2x}}{1+e^{2x}}\right), \\
\text{(b).}\ \ f(t) = \sin^2\left(e^{\sin^2 t}\right), \\
\text{(c).}\ \ f(x) = \sin(\ln x), \\
\text{(d).}\ \ h(x) = \ln\left(x + \sqrt{x^2-1}\right), \\
\text{(e).}\ \ y = x^{\sin x}, \\
\text{(f).}\ \ y = (\sin x)^{\ln x}, \\
\text{(g).}\ \ y = \sin^{-1}(2x+1), \\
\text{(h).}\ \ g(x) = \sqrt{x^2-1}\,\sec^{-1} x, \\
\text{(i).}\ \ y = \cos^{-1}(e^{2x}), \\
\text{(j).}\ \ h(x) = \ln(\cosh x), \\
\text{(k).}\ \ y = e^{\cosh(3x)}.
\end{gathered}
$$

**2**. (P477, #25, 32; P478, #38, 57) Find the limit. Use l'Hospital's Rule where appropriate. If there is a more elementary method, consider using it. If l'Hospital's Rule doesn't apply, explain why.

$$
\begin{gathered}
\text{(a).}\ \ \lim_{x\to 0} \frac{e^x - 1 - x}{x^2}, \\
\text{(b).}\ \ \lim_{x\to 0} \frac{\cos mx - \cos nx}{x^2}, \\
\text{(c).}\ \ \lim_{x\to 0} \frac{e^x - e^{-x} - 2x}{x - \sin x}, \\
\text{(d).}\ \ \lim_{x\to 0} (1-2x)^{1/x}.
\end{gathered}
$$