1. a) Calculate $\tan \frac{4\pi}{3}$.

b) Prove $\frac{\sin 3x}{\sin x} - \frac{\cos 3x}{\cos x} = 2$

2. $y \cos 2x = x \sin 2y$, $y' = $

3. $y = \frac{x^2}{\arctan 2x}$, $y' = $

4. Sketch the graph: $y = x - \cos x$.

5. Find the magnitude and direction of the velocity at $t = \frac{1}{12}$ of an object which moves so that $x(t) = \sin(2\pi t)$, $y(t) = \cos(2\pi t)$. 