

Differentiability

1) $x = a(\theta + \sin\theta)$ and $y = a(1 - \cos\theta)$, $\frac{dy}{dx} = ?$

2) $y = x e^{-x}$, $\frac{dy}{dx} = ?$

3) $x = 3\cos\theta - \cos^3\theta$
 $y = 3\sin\theta - \sin^3\theta$] find $\frac{dy}{dx} = ?$

4) If $y = \tan^{-1} \left[\frac{\cos x}{1 + \sin x} \right] \Rightarrow \frac{dy}{dx} = ?$ \downarrow

[Hint \rightarrow try to form
 $\tan^{-1}(\tan \theta)$
inside.]

[$\frac{\sin(\frac{\pi}{2} - x)}{2} = \frac{\cos x}{2}$
 $1 + \cos x = 2 \cos^2 \frac{x}{2}$