

Show work!

- Find the following limit. (Hint: $\lim_{\theta \rightarrow 0} \frac{\sin(\theta)}{\theta} = 1$) $\lim_{\theta \rightarrow 0} \frac{\tan 12\theta}{\theta}$

- Find $\frac{dy}{dx}$ (Hint: Use product rule and chain rule):

$$y = \cos(x^2) x$$

- Find $\frac{dy}{dx}$

$$y = x \tan(x) + x^{-2} + 3$$

- Find $\frac{dr}{d\theta}$ (Hint: Use implicit differentiation):

$$r\theta + \sin(r\theta) = 4$$

- James Bond is inflating a hot air balloon (perfectly sphere) at a rate of $30 \text{ m}^3/\text{second}$ to escape Dr. Evil. How fast is the radius changing when the radius is 10 m ? James Bond wants you to solve for $\frac{dr}{dt}$, but does not need you to simplify (Hint: $v = \frac{4}{3}\pi r^3$ and a picture might help!)