

1) Evaluate  $\frac{dy}{dx}$  of the following function.

$$x^2 - xy^2 + \tan(y) = 0 \quad (1)$$

2) A particle is moving on the graph of the function  $y = \frac{x^2-1}{3x+1}$ . If the speed of this particle in direction of x-axis is  $2\frac{cm}{sec}$  at the point  $(1, 0)$ , then find  $\frac{dy}{dx}$ .  
Hint: Differentiate both side of this equation with respect to t and consider x and y independent functions of t.

3) Find  $x$  such that the tangent line to the function  $f(x) = xe^x$  passes through the origin.

Hint: Pick an arbitrary point on the graph of this function like  $a, ae^a$ . Then, find the equation of the tangent line passes through this point, (you need to find the slope of the tangent line for this point, too). When you find the general equation, check for what value of  $a$ ,  $(0,0)$  is a point on this line.