

# SOLUTIONS

## CALCULUS-II, MATH 2153-006, 23-APR-2009 QUIZ-6

Find the equation of the tangent line to the curve

$$x = t^{-1} - t, \quad y = 5 + t^2$$

at the point corresponding to  $t = 1$ .

$$\text{Slope of the tangent} = \frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{2t}{-\frac{1}{t^2} - 1} = \frac{2t^3}{-1 - t^2}$$

$$\text{slope at } t=1 = \left. \frac{dy}{dx} \right|_{t=1} = \left. \frac{2t^3}{-1-t^2} \right|_{t=1} = \frac{2}{-2} = -1.$$

At  $t=1$ , the point on the curve :-  $x = (t^{-1} - t)|_{t=1} = 1 - 1 = 0$ .  
 $y = (5 + t^2)|_{t=1} = 5 + 1 = 6$ .

Equation of line passing through  $(0, 6)$  with slope  $-1$  is

$$\begin{aligned} y - 6 &= -1 \cdot (x - 0) \\ &= -x \end{aligned}$$

or  $y + x = 6$ .

Answer =

$x + y = 6$