Solve the problem.

1) A ladder is slipping down a vertical wall. If the ladder is 10 ft long and the top of it is slipping at the constant rate of 3 ft/s, how fast is the bottom of the ladder moving along the ground when the bottom is 8 ft from the wall?

2) A container is the shape of an inverted right circular cone has a radius of 5 inches at the top and a height of 6.00 inches. At the instant when the water in the container is 2 inches deep, the surface level is falling at the rate of -0.400 in./s. Find the rate at which water is being drained.

Find an equation for the line tangent to the curve at the point defined by the given value of t.

3) \( x = 6 \sin t, \ y = 6 \cos t, \ t = \frac{\pi}{4} \)

Solve the problem.

4) Find the points at which the tangent to the curve \( x = 6 - t^2, \ y = t^3 - 5t \) is vertical and horizontal.
For the equation below, do each of the following.

5) \(2y^2 + 7x^2 - 13 = 0\)

a) Find \(\frac{dy}{dx}\) by implicit differentiation.

b) Determine the equation of the tangent line when \(x = 1\).

c) Find the points on the curve where the lines tangent to the curve are vertical.

d) Find \(\frac{d^2y}{dx^2}\) in terms of \(x\) and \(y\).