1. Find the distance traveled by a particle if it follows the path given by the parametric equation \( x = \cos^2 t, \)
\[ y = \cos t \]
from \( t = 0 \) to \( t = \frac{11\pi}{3} \).

2. Find the equation of the lines tangent to \( x = \sin t, \) \( y = \sin(t + \sin t) \) at the point \((0,0)\).
3. Consider the parametric equation \( x = 3t - t^3, \ y = 3t^2 \). The graph is shown below.

(a) Find the length of the loop of the curve.

(b) Find the area of the surface obtained by rotating the curve from \( 0 \leq t \leq 1 \) about the \( x \)-axis.