Problem 1

Given the parametric equations

$$x = t^2 + 3, \quad y = \sqrt{t}\sin(t),$$

determine the equation of the tangent line when $t = 1$.

Problem 2

Find the length of the curve given by the parametric equations

$$x = 2\cos(t), \quad y = 2\sin(t) \quad 0 \leq t \leq \pi.$$

Problem 3

Find the length of the curve given by the parametric equations

$$x = 3\cos^2(2t), \quad y = 3\sin^2(2t) \quad 0 \leq t \leq \pi/4.$$

Problem 4

Find the length of the curve $y = \frac{3x^{3/2}}{4}$ from $x = 1$ to $x = 2$.