

6 09-11-2025

6.1 Section 3.3, Checkpoint 3.9

Calculate the arc length of the parameterized curve

$$\mathbf{r}(t) = \langle 2t^2 + 1, 2t^2 - 1, t^3 \rangle, \quad 0 \leq t \leq 3$$

Extension: write the arc length parametrization by solving for t in terms of s

6.2 Section 3.3, Checkpoint 3.13

Find the equation of the osculating circle of the curve defined by the vector-valued function

$$y = 2x^2 - 4x + 5 \text{ at } x = 1$$

6.3 Section 3.3, Exercise 3.143

Find the equation for the osculating plane at point $t = \frac{\pi}{4}$ on the curve

$$\mathbf{r}(t) = \cos(2t)\hat{i} + \sin(2t)\hat{j} + t\hat{k}$$