



Tutorial 3

Question 1

Find the equation of the tangent line to the curve $x = 3e^t, y = 5e^{-t}$ at $t = 0$.

Question 2

Find the graph of the polar equation $r = 4\cos\theta - 5\sin\theta$.



Question 3

Find the area of the surface generated by revolving the parametric curve

$$x = \frac{1}{2}t^2 \quad \text{and} \quad y = \frac{1}{3}(2t+1)^{3/2}, \quad 0 \leq t \leq 1.$$

about the y-axis.

Question 4

Find the slope of the line that is tangent to the polar curve

$$r = 3 \sin \theta$$

at $\theta = \frac{\pi}{2}$.



Question 5

Find the area of the surface generated by revolving the parametric curve

$$x = e^t - t \quad \text{and} \quad y = 4e^{t/2}, \quad 0 \leq t \leq 1.$$

about the x-axis.

Question 6

Find the slope and the equation of the tangent line to the graph of the polar curve

$$r = e^{2\theta}$$

at $\theta = 0$.



Question 7

Find the arc length of the polar curve $r = e^\theta$ from $\theta = 0$ to $\theta = \ln 2$.

Question 8

Consider the curve given by

$$x^{2/3} + y^{2/3} = 4, \quad 1 \leq x \leq 8.$$

- (a) Find the arclength of the curve.
- (b) Find the area of the surface obtained by rotating the curve about the x-axis.

Hint: Use implicit differentiation to find $\frac{dy}{dx}$.



Question 9

Find the area of the surface obtained by rotating the graph of

$$f(x) = 2\sqrt{x+1}, \quad 0 \leq x \leq 1$$

about the x-axis.