Name: _____ Mark: _____ / 16

Mini-math Div 3/4: Friday, January 19, 2024 (9.6-9.9) - (24 minutes)

Calculator active

1. (4 points) The velocity vector of a particle moving in the plane is given by

$$\langle 5 - 2\cos(t^2), 8\sin(t^2)\cos(e^t)\rangle, \text{ for } 0 \leq t \leq 2$$

At time $t = 0$, the particle is at position $(3, -1)$. Write an equation for the line tangent to the path of the particle at $t = 1$.

2. (4 points) Where does the graph $r = 1 - \sin\theta$, $0 \leq \theta \leq 2\pi$, have a vertical tangent?

3. (4 points) Find the area of the inner loop of $r = 4\sqrt{3} - 8\cos\theta$

4. (4 points) Find the area of the region common to $r = 1 - \sin\theta$ and $r = 2\sin\theta$.