1. Describe motion of the particle with position $(x, y)$ where 
   \[ x = 2 + \cos t, \quad y = 3 + \sin t \]
   \[ 0 \leq t \leq 2\pi. \] [2]

2. Find length of the curve $r = 1 + \sin \theta$. [3]
3. Calculate area of the region outside the cardioid $r = 2 - 2 \cos \theta$ and inside the circle $r = 4$. 

[4]
1. For the parametric curve $x = t^3 - 12t, y = t^2 - 7$, find $\frac{d^2y}{dx^2}$. For what values of $t$, the curve is concave upwards. [2]

2. Test the function $r = 5\cos 3\theta$ for symmetry and draw the graph of this polar curve by selecting a suitable scale. [3]
3. Find the area bounded by the curve $r = 6 - 6 \sin \theta$. [4]
1. Sketch the parametric curve $x = \sin t, y = \sin^2 t$. \[2\]

2. For the curve $r = 2 + 2 \cos \theta$, find points at which the tangent line is vertical. \[3\]
3. Find area of the surface generated by revolving the curve \( x = \cos^2 t, y = \sin^2 t, \quad 0 \leq t \leq \frac{\pi}{2} \)
about the \( x \)-axis.