Time: 20 minutes   Marks: _____/9

Name: _____   Section #: _____

ID #: _____   Serial #: _____

1. Describe motion of the particle with position (x, y) where

   $x = 2 + \cos t, y = 3 + \sin t$ and $0 \leq t \leq 2\pi$.   [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]

Time: 20 minutes   Marks: _____/9

Name: _____   Section #: _____

ID #: _____   Serial #: _____

1. For the parametric curve $x = t^3 - 12t, y = t^2 - 7$, find $\dfrac{d^2y}{dx^2}$. 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]

Time: 20 minutes   Marks: _____/9

Name: _____   Section #: _____

ID #: _____   Serial #: _____

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 $x = \cos^2 t, y = \sin^2 t,$ $\left(0 \leq t \leq \dfrac{\pi}{2}\right)$ about the x-axis. [4]