MATH 53

Quiz 1 – 07/01

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This is a closed book/notes test. Calculators are not permitted

1. Sketch the curve given by equation $r(\theta) = 1 - \sin\theta$ and find the area that it encloses.

2. In class we calculated the area of the region confined by astroid given by parametric equations $x(\theta) = a\cos^3\theta,\ y(\theta) = a\sin^3\theta$ where $0 \leq \theta \leq 2\pi$. In this problem you need to calculate the length of the curve.

3. Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ if

$$x(t) = e^t\,, \qquad y(t) = t\,e^t\,, \qquad -\infty < t < +\infty\,.$$

For which values of parameter t is the curve concave upward? Sketch the plot.

4. Find a polar equation for the curve represented by the following Cartesian equations

   (a) $5y^2 = x$,

   (b) $x^2 + 3y^2 = 2x$.