Math 252 Calculus II (Bueler) Name: _____

Written Homework #9

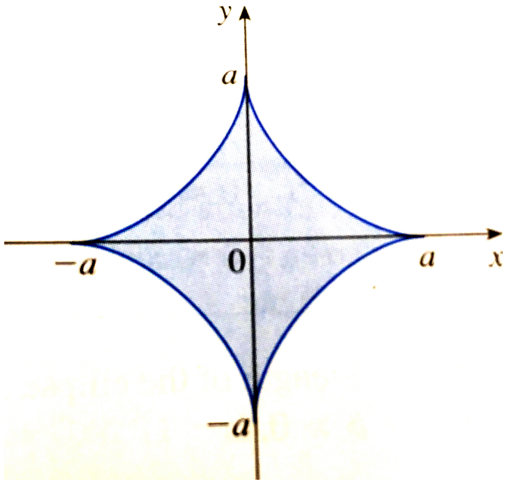
Due at start of class Monday, 26 March.

This Written Homework has problems from sections 10.2 and 10.3. It is also a work sheet to do during the recitation section. Please work on it with other students! The submitted version must be written by you. You must show your work for full credit.

1. Graph the curve $x = -2\cos t$, $y = \sin t + \sin 2t$ to discover where it crosses itself. (*Use a computer as needed. Show a sketch or figure.*) Then find equations of both tangents at that point.

2. Find the length of the loop of the curve $x = 3t - t^3, y = 3t^2$. (*Use a computer as needed. Show a sketch or figure. Find the exact values of t which are the limits of integration.*)

3. (a) Find the area of the astroid $x = a\cos^3\theta, y = a\sin^3\theta$ shown below.



(b) Find the length of the astroid.

4. Consider the parameterized curve $x = t + \sqrt{t}$, $y = t - \sqrt{t}$ on $0 \leq t \leq 1$. Set up an integral to compute the length. Use a computer to evaluate this integral to find the length. Sketch the curve; it should illustrate that your answer is reasonable.

5. Sketch the region in the plane consisting of the points whose polar coordinates satisfy the given conditions:

$$1 \leq r \leq 3, \quad \frac{\pi}{6} \leq \theta \leq \frac{5\pi}{6}$$

6. Sketch the curve with the polar equation $r = \theta^2$, for the range $-2\pi \leq \theta \leq 2\pi$, by first sketching the graph of r as a function of θ in Cartesian coordinates.

7. Sketch the curve with the polar equation $r = 3 + \cos(3\theta)$ by first sketching the graph of r as a function of θ in Cartesian coordinates.