CALCULUS II, SUMMER 2015 - WEEKEND PROBLEM SET 4

60 points total = 50 points + 10 extra credit points

Name: _____ Score: _____/ 50

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

Please indicate clearly which problems you have worked on. You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

Read Section 9.5, the section on conic sections, in Stewart, and do the following problems.

Problem 1 (20 points)**.** Write a polar equation of a conic with the focus at the origin and the given data:

1. Parabola, directrix $x = -3$
2. Hyperbola, eccentricity 3, directrix $x = 3$
3. Ellipse, eccentricity 0.8, vertex $(1, \pi/2)$
4. Hyperbola, eccentricity 3, directrix $r = -6 \csc\theta$

Problem 2 (20 points)**.** For each of the following polar curves, (a) find the eccentricity, (b) identify the conic, (c) give an equation of the directrix, and (d) sketch the conic.

1. $r = \frac{12}{3-10\cos\theta}$
2. $r = \frac{3}{2+2\cos\theta}$
3. $r = \frac{5}{2-2\sin\theta}$
4. $r = \frac{4}{2+\cos\theta}$

Problem 3 (10 points)**.** The Hale–Bopp coment, discovered in 1995, has an elliptical orbit with eccentricity 0.9951 and the length of the major axis is 356.5 AU. Find a polar equation for the orbit of this comet. How close to the sun does it come?

Problem 4 (10 points)**.** Show that the parabolas $r = c/(1 + \cos\theta)$ and $r = d/(1 - \cos\theta)$ intersect at right angles.

All problems are taken from page 534 of James Stewart, *Essential Calculus: Early Transcendentals* (2e).

Date: August 3, 2015.