Math 281 Homework 5 Name: _____

Complete the following problems on your own paper. If you use notebook paper, please remove the jagged edges of the paper before submitting your homework. Your solutions must be numbered and submitted in the order the problems were given, legibly written using correct notation and including all mathematical details. If you submit work that is messy, hastily written, or lacking detail, you should expect to receive little credit regardless of having the correct final answer.
Due: 8:00am on Tuesday, November 5

1. A ball with mass 0.8 kg is thrown southward into the air with a speed of 20 m/s at an angle of 30° to the ground. A southwest (S45°W) wind applies a steady force of 2 N to the ball. Where does the ball land relative to where it was thrown and with what speed?

   Note : Consider the xy plane to be the ground where $\hat{i}$ points east and $\hat{j}$ points north. The $\hat{k}$ component of the position vector determines the height of the ball above the ground and points up.

2. Given the position vector $\vec{r}(t) =< t, 2e^t, e^{2t} >$, find the curvature, velocity, speed, and the tangential and normal components of the acceleration vector.
   Note : Use the component formulas for acceleration as discussed in class.

3. Find and sketch the domain of the functions

   (a) $f(x,y) = \sqrt{y+2x-3}\ln(x-y^2)$
   (b) $f(x,y) = \arccos(x^2+y^2-8)$
   (c) $f(x,y,z) = \sqrt{36-4x^2-y^2-9z^2}$

4. Describe and draw several level curves for the functions.

   (a) $f(x,y) = xy$
   (b) $f(x,y) = \ln y - x$