Matlab Computer Final, Spring 2004

5pm exam
For each of the questions below, solve them using MATLAB. Turn in a printout with your name on it, the MATLAB instructions to solve the problem, and graphs, if applicable.
Make sure your name is on your printout. Printouts without names on them will be destroyed.

1. Consider the part of the surface $z = x^2y - xy^3 + 8$ with $0 \leq x \leq 2$, and $-1 \leq y \leq 2$.
   (a) Plot the surface over the indicated range.
   (b) Construct a contour plot of that part of the surface with 30 contours.
   (c) Plot the surface together with its tangent plane at the point where $x = -0.8$ and $y = 0.5$. Choose a vantage point from which you can see that the plane is tangent to the surface.

2. (a) Use the integration commands in the symbolic toolkit to find the volume of the solid region between the $xy$ plane and the surface drawn in Question 1.
   (b) Use the numerical integration command `dblquad` to find the volume of the solid region between the $xy$ plane and the surface drawn in Question 1.

3. The sum $\sum_{n=1}^{\infty} (-1)^n + 1 \frac{2 + \arctan(n)}{5n^2 + 3}$ converges by the alternating series test.
   (a) How many terms are needed to estimate the sum of the series within .001?
   (b) Find the sum of the series to within .001.