Math 401 - Homework #5
Curve Fitting and Team Ranking
due in class Thursday, 6/14

Instructions: Work through the problems below. Write down your solutions on paper. You can use MATLAB for computations unless the problem says "Must do all computations by hand." For problems in which you use MATLAB to do computations, I do not want you to turn in any MATLAB code. You need to clearly present all steps of your solution so that I can follow your thought process without guessing what you are thinking (try writing in complete sentences.)

1. Do Exercise 5.4 from the text. (For the plot, either include a MATLAB printout or draw a rough sketch on paper of a plot you create in MATLAB).

2. Do Exercise 5.6 from the text. (Each triple is an (x, y, z). You are trying to fit $z = Ax^2 + By^2$ to the data.)

3. Do Exercise 5.8 from the text. (Each data point is the polar coordinates (θ, r) of the object. r is the distance from the object to the origin and θ is the angle that the object makes with the positive x-axis.)

4. Do Exercise 5.13 from the text.

5. Do Exercise 6.1 from the text.

6. Suppose four teams play six games with the following results:

   - Team 1 beats Team 2 by 5 points. Team 1 at home.
   - Team 1 beats Team 3 by 10 points. Team 3 at home.
   - Team 2 beats Team 3 by -10 points. Team 2 at home.
   - Team 2 beats Team 3 by 7 points. Team 3 at home.
   - Team 2 beats Team 4 by -14 points. Team 2 at home.
   - Team 3 beats Team 4 by 21 points. Team 3 at home.

   (a) Find the team rankings, ignore the "at home" aspect.

   (b) Suppose when a team plays at home it has a point advantage. Suppose history suggests to factor this into the scores as follows: if a team wins at home, the winning point difference should be multiplied by 0.75 before calculating the ranking. If a team wins in an away game, we do not multiply the score difference by anything. For example, the first game should be interpreted as $r_1 - r_2 = (0.75) \cdot 5$ because Team 1 was at home, but the second game tells us $r_1 - r_3 = 10$. Find the new team rankings; do they change?

7. **(Must do all computations by hand.)** Do Exercise 6.8 from the text. (For (a), present the rankings in terms of the unknown α.)