Answer any **three** of the following:

1. In class we used Elo to rank the ACC teams ignoring the margin of victory.
   (a) Suggest a way to incorporate margin of victory into Elo rankings.
   (b) Use a computer to calculate the rankings under your method for the ACC data.

2. After a season is over, one can look back and try to determine the “most important game”.
   (a) Propose a mathematical definition of “most important game”.
   (b) Using a computer, determine this game for the ACC data for **one** of our three systems.

3. Consider a football season where there are 100 teams and everyone plays everyone else once (no ties). Assume team Alpha win every game they play.
   (a) Explain why it does not necessarily follow that Alpha will always be the highest ranked team.
   (b) For each of the three systems, try to determine the lowest that Alpha can be ranked.

4. Consider a floor divided into parallel strips one foot wide. Consider a stick one-foot long that is tossed randomly onto the floor.
   (a) Prove that the probability that the stick intersects more than one strip is $2/\pi$.
   (b) Use this and software to provide a Monte Carlo estimation of $\pi$.

5. (a) Create a question on the course so far suitable for use in a class test (say worth 20 to 25 points on a 1-hour test).
   (b) Provide a model answer.

Due: **Thursday Sept 18.**