

MAE 301/501 HOMEWORK-7 DUE ON THURSDAY, NOVEMBER 18

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. Solutions with little or no justification will receive little or no credit.

- (1) Three undergraduates, four professors, and three graduate students wait in line at the SAC.
 - (a) How many ways are there for them to line up.
 - (b) How many ways are there for them to line up if the undergraduates go first, followed by the graduate students, followed by the professors?
 - (c) How many ways are there for them to line up if the undergraduates are together, the grad students together, and the faculty together?
 - (d) Make sure you carefully justify your work, regardless of method.
- (2) Suppose you pick four cards from a standard deck of 52.
 - (a) What is the probability that you draw four aces?
 - (b) What is the probability that you draw exactly two aces in a row?
 - (c) What is the probability that you draw exactly two black cards and exactly two queens?
 - (d) Make sure you carefully justify your work, regardless of method.
- (3) The monomials x^2y and yx^2 are equal. In the problems below, we only consider monomials with coefficient of 1.
 - (a) Determine the number of distinct, degree 3 monomials in 2 variables.
 - (b) Determine the number of distinct, degree n monomials in 2 variables.
 - (c) Determine the number of distinct, degree n monomials in 3 variables.
 - (d) Determine the number of distinct, degree n monomials in k variables.
 - (e) Prove/justify each of the results above. If you don't yet have a complete proof for the general result, give a clearly written description, with examples, of your understanding of the problem.
- (4) Suppose you want to paint the surface of a cube. You have six colors and will paint one color on each side. How many distinct ways are there to do this? Prove your result.