

**MATH 301/501 HOMEWORK-5 DUE AT THE BEGINNING OF CLASS ON
THURSDAY, NOVEMBER 6.**

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.

(1) *Only this problem is due on Thursday, November 6.*

- (a) Determine the number of distinct, degree 3 monomials in 2 variables.
- (b) Determine the number of distinct, degree 1 monomials in 3 variables.
- (c) Determine the number of distinct, degree n monomials in 2 variables.
- (d) Determine the number of distinct, degree n monomials in 3 variables.
- (e) Make a conjecture of the formula for the number of distinct, degree n monomials in k variables.

All other problems are due at the beginning of class on Thursday, November 13.

(2) Three undergraduates, four professors, and three graduate students wait in line at a math conference.

- (a) How many ways are there for them to line up if the undergraduate go first, followed by the graduate students, and then the professors?
- (b) How many ways to line up if the undergraduates are together, the graduate students together, and the faculty together?

(3) Suppose that the Stony Brook Football Team plays 11 games during the season. In how many ways can they win 5 games, lose 4 games, and tie 2 games?

(4) You toss a fair coin 8 times; what is the probability of getting at least 3 heads?

(5) You toss a fair coin 8 times; what is the probability of getting at least 3 heads in a row?

(6) You roll a fair die 4 times; what is the probability of getting 2 sixes?

(7) You roll a fair die 4 times; what is the probability of getting at least 3 sixes in a row?

(8) Suppose you pick 4 cards from a standard deck of 52.

- (a) What is the probability that you draw 4 aces?
- (b) What is the probability that you draw 2 aces in a row?
- (c) What is the probability that you draw exactly 2 red cards and exactly 2 kings?