Probability

(CS 3332) – Spring 2010

Mid-term Exam I (April 16, 2010)

1. (20 points) Delegates from n nations attend a meeting in the United Nations (UN). After the meeting they sit in a row to take a picture. Delegates from England and from France want to sit next to each other. Delegates from Israel and Iran do not want to sit next to each other. How many ways are there to arrange their seats?

2. (20 points) Let A and B be two events. Prove that

$$P(AB) \geq P(A) + P(B) - 1.$$

3. (20 points) The coefficients of the quadratic equation $x^2+bx+c = 0$ are determined by tossing a fair die twice (the first outcome is b, the second one is c). Find the probability that the equation has real roots.

4. (25 points) An urn contains 10 white and 12 red chips. Two chips are drawn at random and, without looking at their colors, are discarded. What is the probability that a third chip drawn is red?

5. (25 points) We draw cards, one at a time, at random and successively from an ordinary deck of 52 cards with replacement. What is the probability that an ace appears before a face card?