Math 477, Lecture 2 class work

Name: _____

Net ID: _____

1. Given a class with 10 students, how many ways are there to separate them into 5 groups consisting of 2 students each?

$$\binom{10}{2,2,2,2,2} \text{ if the groups are distinguishible, and } \frac{\binom{10}{2,2,2,2,2}}{5!} \text{ otherwise.}$$

2. If we roll a die 10 times, how many ways can we get exactly 3 ones, 3 twos, 2 threes and 2 fours? What's the probability that this occurs?

   There are $\binom{10}{3,3,2,2}$ ways. The probability is $\frac{\binom{10}{3,3,2,2}}{6^{10}}$.

3. Given a class with 10 students, if we distribute 5 identical balls to the class (students are allowed to receive more than 1 ball), what's the probability that no one gets more than 1 ball??

$$\frac{\binom{10}{5}}{\binom{14}{5}}$$

4. If we roll a die 10 times, how many ways can we get exactly 6 ones? What's the probability that this occurs?

   There are $\binom{10}{6}5^4$ ways this can happen. The probability is $\frac{\binom{10}{6}5^4}{6^{10}}$.

5. Let $S = \{1, 2, 3, 4, 5, 6, 7\}$, $A = \{1, 2, 3\}, B = \{1, 3, 4, 5\}, C = \{4, 5, 6\}$. Compute the following sets:

$$ABC, \quad A^cBC, \quad AB^cC, \quad A+B+C, \quad (A+B)^cC, \quad (A+B+C)^c$$

$$ABC = \emptyset, \quad A^cBC = \{4, 5\}, \quad A+B+C = \{1, 2, 3, 4, 5, 6\}, \quad (A+B)^cC = \{6\}$$

6. Suppose S is a sample space with subsets A, B, and such that $P(A+B) = 0.7$, $P(A) = P(B) = 0.5$. What is $P(AB^c)$? What is $P(AB)$?

   $P(AB) = 0.3 = P(A) + P(B) - P(A+B)$. $P(AB^c) = P(A) - P(AB) = 0.2$.