

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:

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

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

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  $P(AB)$ ?

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