

FINITE MATH, FALL 2016 - PROBLEM SET 7

Name: _____

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

Problem 1. We have some books we want to arrange on a shelf: 4 blue, 3 green, and 2 red. Find the following:

- (1) In how many ways can the books be arranged on the shelf?
- (2) If the books of the same color are to be grouped together, how many arrangements are there?
- (3) In how many distinguishable ways can the books be arranged if books of the same color are identical but need not be grouped together?
- (4) In how many ways can you select 3 books, one of each color if order does not matter?
- (5) How many ways can you select 3 books, one of each color, if the order in which the books are picked matters.

Problem 2. Show that

$$\binom{n}{r} = \binom{n}{n-r}$$

Problem 3. In a club with 9 male and 11 female members, a 5-member committee will be randomly chosen. Find the probability that the committee contains the following:

- (1) All men.
- (2) All women.
- (3) 3 men and 2 women.
- (4) At least 4 women.

Problem 4. A fair coin is tossed 10 times. What's the probability of getting:

- (1) Five heads.
- (2) At least 3 heads.

Problem 5. 5 cards are drawn from a standard deck of 52 cards. Find the following:

- (1) Four of a kind.
- (2) Three of a kind.
- (3) One pair.

Problem 6. A die is rolled 12 times. Find the probability of rolling the following events:

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- (1) Exactly 12 ones.
- (2) No more than 3 ones.
- (3) Exactly 2 ones.

Problem 7. The probability that a certain machine turns out a defective item is 0.05. Find the probability that in a run of 75 items, the following results are obtained:

- (1) Exactly 5 defective items.
- (2) No defective items.
- (3) At least 1 defective item.

Problem 8. Bonus.

Prove that

$$\binom{n}{r} + \binom{n}{r+1} = \binom{n+1}{r+1}$$