

Exam 2 Review Questions

COUNTING

1. You are dealt a hand of 5 cards. How many ways can you be dealt at least 3 hearts?

$$\frac{C(13,3) \cdot C(39,2)}{3H \text{ and } 2HC} + \frac{C(13,4) \cdot C(39,1)}{4H \text{ and } 1HC} + \frac{C(13,5) \cdot C(39,0)}{5H \text{ and } 0HC} - 0 = 241,098$$

mut excl

2. Three families are going to a basketball game together. The Smith family has 3 members, the Jones family has 4 members and the Farmer family has 6 members. How many ways can these 13 people be seated in a row if members of the same family sit together?

$$\frac{3!}{\text{arr. families}} \cdot \frac{3!}{\text{Smith}} \cdot \frac{4!}{\text{Jones}} \cdot \frac{6!}{\text{Farmer}} = 622,080$$

3. A mantel is being decorated for Spring. There are 9 decorations: 1 large bunny, 4 identical baby bunnies, a pair of identical candlesticks and 2 different plants. How many distinguishable ways can these decorations be arranged?

$$\frac{9!}{(1! \cdot 4! \cdot 2! \cdot 1!1!)} = 7560$$

LB BB CS Plants

4. A bag has 5 pennies, 4 dimes and 6 quarters. Four coins are chosen at random from the bag

a. How many ways can the chosen coins be all quarters?

$$\frac{C(6,4)}{4Q} \cdot \frac{C(9,0)}{0Q} = 15$$

b. At least one penny

$$\frac{C(15,4)}{\text{no restr}} - \frac{C(5,0)}{0P} \cdot \frac{C(10,4)}{4QC} = 1155$$

c. How many ways can the chosen coins have exactly 3 pennies or exactly 1 dime?

$$\frac{C(5,3)}{3P} \cdot \frac{C(10,1)}{1QC} + \frac{C(4,1)}{1D} \cdot \frac{C(11,3)}{3QC} - \frac{C(5,3)}{3P} \cdot \frac{C(4,1)}{1D} = 720$$

Union rule!

5. How many ways can a class of 18 students be put into 3 groups of 6 students?

$$\frac{C(18,6)}{\text{Group 1}} \cdot \frac{C(12,6)}{\text{Group 2}} \cdot \frac{C(6,6)}{\text{Group 3}} = 17,153,136$$

BASIC PROBABILITY

1. A cup has one gold, one silver and one bronze coin in it. A single coin is chosen at random from the cup. How many events for this experiment contain a gold or silver coin?

$$S = \{G, S, B\} \quad n(S) = 3 \Rightarrow 2^3 = 8 \text{ events: } \emptyset, \{G\}, \{S\}, \{B\}, \{G,S\}, \{G,B\}, \{S,B\}, \{G,S,B\}$$

$\Rightarrow 6 \text{ have } G \text{ or } S$

2. A letter is chosen at random from the word WOOD. How many outcomes are in the uniform sample space for this experiment

$$4 \text{ as } S = \{W, O, O, D\}$$

3. Two fair six-sided dice are rolled. What is the probability that the sum is greater than 10 or at least one 5 is showing?

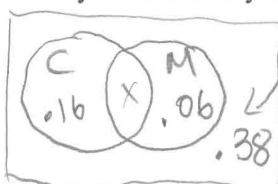
$$\text{draw sample space} \Rightarrow P = \frac{3}{36} + \frac{11}{36} - \frac{2}{36} = \frac{12}{36}$$

{6-5, 5-6, 6-6}

4. A class has 150 students and the maximum grade possible in this class is 100. Eleven students had a grade of 90 or more. Forty-one students had grades of 80 or more. Fifty-seven students had a grade that was greater than or equal to 60 but less than 70. Ten students had grades less than 60. Organize this information in a probability distribution table.

$X < 60$	$60 \leq X < 70$	$70 \leq X < 80$	$80 \leq X < 90$	$X \geq 90$
$10/150$	$57/150$	$150 - 108 \Rightarrow 42/150$	$41 - 11 \Rightarrow 30/150$	$11/150$

4. A coffee shop finds that 44% of its customers do not order coffee, 16% order only coffee, and 6% order only a muffin. What is the probability that a randomly selected customer will order coffee or a muffin?



$$.44 - .06 = .38$$

$$X = 1 - .16 - .06 - .38 = .4$$

$$P(M \cup C) = .16 + .4 + .06 = .62$$