

## 9/24 - Review for Exam 1

### Outline:

- Review Problem Set 1
- Answer Student-Submitted Questions  
#2, 3, 7, 8a, 10c, 11'
- Time for Group Study

Sep 24-8:35 AM

## Exam #1 Review Sheet

2. Twelve siblings (5 boys and 7 girls) must complete the Saturday chore list. There are five chores: rake the lawn, wash the dishes, clean the windows, vacuum the rug, and scrub the kitchen floor. In how many ways can five siblings be chosen to do these tasks? In how many ways can all girls be chosen for these chores?

order matters:  $P(12, 5) =$   
 $P(7, 5) =$

— — — — —

Sep 24-8:55 AM

3. Three cards are drawn without replacement from an ordinary deck of 52 playing cards.
- What is the probability that the third card is a spade given the first two cards were not spades?
  - What is the probability that three spades will be selected in a row? Can you find it in two different ways?

$$a) \frac{13}{50} \frac{\text{spades left}}{\text{cards left}}$$

$$b) \frac{13}{52} \cdot \frac{12}{51} \cdot \frac{11}{50} = \frac{C(13,3)}{C(52,3)} = \frac{P(13,3)}{P(52,3)}$$

Sep 24-8:56 AM

5. Consider the following spinners: One has an equally likely chance to land on 0, 1, 2, or 3 and the other has an equally likely chance to land on 2, 3, 4, or 5. Let A be the event that the sum of the digits is odd, let B be the event that the sum of the digits is 4, let C be the event that the numbers match, and let D be the event that the sum is greater than 5. Find the following probabilities.

a.  $P(A \cup B) = P(A) + P(B)$

b.  $P(C)$

c.  $P(A \cup D)$

d.  $P(A|D) = \frac{2}{6} = \frac{P(A \cap D)}{P(D)}$

e.  $P(C|D) = \frac{1}{6} = \frac{\frac{2}{16}}{\frac{6}{16}} = \frac{2}{6}$

$$S = \{(0,2), (0,3), (0,4), (0,5), (1,2), (1,3), (1,4), (1,5), (2,2), (2,3), (2,4), (2,5), (3,2), (3,3), (3,4), (3,5)\}$$

Sep 24-10:28 AM

7. A coin is tossed six times in succession. What is the probability that
- at least one head occurs? =  $1 - P(\text{no H}) = 1 - \frac{1}{64} = \frac{63}{64}$
  - exactly three heads occur? =  $\frac{C(6,3)}{64}$
  - more than four heads occur?

$$\begin{aligned}
 & P(5H) + P(6H) \\
 &= \frac{C(6,5)}{64} + \frac{C(6,6)}{64} \\
 &= \frac{7}{64}
 \end{aligned}$$

b)  $\_ \_ \underline{H} \underline{H} \_ \_ \underline{H}$

Sep 24-8:56 AM

8. Suppose a box contains 2 red balls and 1 white ball and a second box contains 2 red ball and 2 white balls. One of the boxes is selected at random and a ball drawn..
- What is the probability that the ball is white?
  - What is the probability that the ball is white given it came from the 1<sup>st</sup> box?

$$\begin{aligned}
 a) P(\text{white}) &= P(\text{box}_1 \cap \text{white}) + P(\text{box}_2 \cap \text{white}) \\
 &= \left(\frac{1}{2}\right)\left(\frac{1}{3}\right) + \left(\frac{1}{2}\right)\left(\frac{2}{4}\right)
 \end{aligned}$$

b)  $\frac{1}{3}$

Sep 24-8:56 AM

10. There are 4 gray, 6 pink, and 2 violet marbles in a hat. You pick 2 marbles from the hat. Marbles are not returned after they have been drawn. What is the difference between the following statements?
- Find the probability that the first marble is pink and the second marble is gray.
  - Find the probability that the second marble is gray given the first marble is pink.
  - Find the probability that exactly one of the marbles is pink.

$$\begin{aligned}
 c) & P(\text{pink}_1 \cap \text{pink}'_2) + P(\text{pink}'_1 \cap \text{pink}_2) \\
 &= \frac{6}{12} \times \frac{6}{11} + \frac{6}{12} \times \frac{6}{11} \\
 & \quad \downarrow \quad \downarrow \\
 & \quad P(\text{pink}'_2 | \text{pink}_1)
 \end{aligned}$$

Sep 24-8:56 AM

11. Use the rules of probability to solve: If  $P(E) = 0.40$ ,  $P(F) = 0.35$  and  $P(E \cup F) = 0.55$ , find  $P(E|F)$ ?  
 (Careful:  $P(E \cup F)$  is does not mean  $P(E \text{ and } F)$ )

$$P(E|F) = \frac{P(E \cap F)}{P(F)} = \frac{? \ .20}{.35}$$

Additive Rule:

$$\begin{aligned}
 P(E \cup F) &= P(E) + P(F) - P(E \cap F) \\
 .55 &= .40 + .35 - (? \ .20)
 \end{aligned}$$

Sep 24-8:56 AM