

AP Statistics- Unit 4 Exam Review (Ch. 14 – 17)

- A new clothing store advertises that during its Grand Opening every customer that enters the store can throw a bouncy rubber cube onto a table that has squares labeled with discount amounts. The table is divided into ten regions. Five regions award a 10% discount, two regions award a 20% discount, two regions award a 30% discount, and the remaining region awards a 50% discount.
 - What is the probability that a customer gets more than a 20% discount?
 - What is the probability that a customer gets less than a 20% discount?
 - What is the probability that the first two customers both get a 50% discount?
 - What is the probability that none of the first three customers gets more than a 30% discount?
 - What is the probability that the first customer to win a 30% discount is the sixth customer that enters the store?
 - What is the probability that there is at least one customer to win a 50% discount among the first five customers that enter the store?
 - As you enter the store you watch four people in front of you all win 50% discounts. The store manager tells you how lucky you are to be throwing the cube while it is on a hot streak, but a friend with you says you're unlucky because the streak can't continue. Comment on their statements.
- According to the American Pet Products Manufacturers Association (APPMA) 2003-2004 National Pet Owners Survey, 39% of U.S. households own at least one dog and 34% of U.S. households own at least one cat. Assume 60% of U.S. households own a cat or a dog.
 - Draw the Venn Diagram
 - What is the probability that a randomly selected U.S. household owns neither a cat nor a dog?
 - What is the probability that a randomly selected U.S. household owns both a cat and a dog?
 - What is the probability that a randomly selected U.S. household owns a cat if the household has a dog?
 - Is having a dog or a cat mutually exclusive? Explain.
 - Is having a dog or a cat independent?
- An industrial psychologist administered a personality inventory test for passive-aggressive traits to 150 employees. Individuals were given a score from 1 to 5, where 1 was extremely passive and 5 extremely aggressive. A score of 3 indicated neither trait. X is the score.
 - Find the missing probability from the following probability distribution

$X = \text{score}$	1	2	3	4	5
$P(X = x)$	0.16	0.22		0.20	0.14
 - $P(X \leq 3) =$
 - $P(1 < X \leq 4) =$
 - Find the mean and standard deviation.
- If $P(A) = 0.65$ and $P(B) = 0.23$ and $P(A \cap B) = 0.15$, find the following:
 - $P(A \cup B) =$
 - $P(B|A) =$
 - Are A and B disjoint events? Why or why not?
 - Are A and B independent? Why or why not?

5. If $P(D) = 0.37$, $P(C) = 0.41$ and D and C are disjoint, what is the probability of D or C?
6. If $P(K) = 0.71$, $P(R) = 0.23$ and K and R are independent, what is the probability of K and R?
7. If $P(F) = 0.33$ and $P(H) = 0.28$ and $P(H|F) = 0.13$, find the following:
 - a. $P(F \text{ and } H) =$
 - b. $P(F \text{ or } H) =$
8. If $P(A) = 0.25$, $P(A \cup B) = 0.78$, and $P(A \cap B) = 0.12$, find $P(B)$.
9. On a certain day, there is a 37% chance for rain. The probability of John remembering to bring an umbrella to work **and** it raining is 15%. What is the probability that John remembers to bring an umbrella **given that** it rains?
10. In a History class, 50% of the students are males. The probability of a student being a male and a junior is 20%. What is the probability that a student selected at random is a junior given that the student is a male?
11. A survey of an introductory statistics class in Autumn 2003 asked students whether or not they ate breakfast the morning of the survey. Results are as follows:

		Breakfast	
		Yes	No
Sex	Male	66	66
	Female	125	74

- a. What is the probability that a randomly selected student is female?
 - b. What is the probability that a randomly selected student ate breakfast?
 - c. What is the probability that a randomly selected student is a female that ate breakfast?
 - d. What is the probability that a randomly selected female ate breakfast?
 - e. What is the probability that a student who ate breakfast is female?
 - f. Does it appear that whether or not a student ate breakfast is independent of the student's sex? Explain.
12. A manufacturing firm orders computer chips from three different companies: 10% from Company A; 20% from Company B; and 70% from Company C. Some of the computer chips that are ordered are defective: 4% of chips from Company A are defective; 2% of chips from Company B are defective; and 0.5% of chips from Company C are defective. A worker at the manufacturing firm discovers that a randomly selected computer chip is defective. What is the probability that the computer chip came from Company B?
 13. At a raffle, 1500 tickets are sold at \$2 each for four prizes of \$500, \$250, \$150, and \$75.
 - a. Create the probability model.
 - b. What is the expected value for one play?
 - c. Find the standard deviation for one play.
 - d. Find the expected value and standard deviation for 3 plays.

14. The distribution of SAT scores for college-bound male seniors has mean of 1532 and a standard deviation of 312. The distribution of SAT scores for college-bound female seniors has a mean of 1506 and a standard deviation of 304. One male and one female are randomly selected. Assume their scores are independent.
- If their scores are added together what is the new mean and standard deviation?
 - What is the mean and standard deviation of the differences of their scores?
 - Assuming the difference in the scores is normally distributed, what is the probability that a randomly selected female scored higher than a male on the SAT?

15. Given independent random variables with means and standard deviations as shown, find the mean and standard deviation of each of these variables:

	Mean	SD
X	12	5
Y	18	8

- $-2X$
 - $4Y - 7$
 - $X + Y$
 - $X - Y$
 - $X_1 + X_2$
 - $2X - 4Y$
16. Suppose 40% of the drivers have jumper cables. You have driven to a large university campus but left your lights on. Now your car has a dead battery and you don't have jumper cables.
- What is the probability that you would need to ask 7 people if they could jump your car?
 - What is the probability that you would need to ask fewer than 7 if they could jump your car?
 - How many people would you expect to have to ask before you found someone to jump your car?
 - What is the probability that among 8 drivers 3 would have jumper cables?
 - What is the probability that among 6 drivers at least 4 would have jumper cables?
 - What is the probability that among 10 drivers more than half would have jumper cables?
 - How many drivers would you expect to have jumper cables if there were 12 in the parking lot?
 - After never having found someone with jumper cables, and calling you dad for help, you wonder if it isn't true that 40% of the students of the university have jumper cables. You decide to randomly sample 80 drivers. What is the probability that 30 or less have jumper cables?