

HW #28: Chapter 6 & 7.1: Probability Test REVIEW

1. How is the conditional probability that the event E occurs given that event F has already occurred different from the conditional probability of $P(F|E)$?
2. If $P(A) = 0.5$, $P(B) = 0.3$, and $P(A \cap B) = 0.15$, then:
 - a. A and B are disjoint events
 - b. A and B are dependent events
 - c. A and B are independent events
 - d. A and B are not disjoint
 - e. A and B are neither disjoint nor independent
3. If a fair coin is flipped three times with the outcome of each flip independent of each other, then the probability that at least one of the three flips results in a head is what?
4. Only 20% of the applicants for new positions at a large software company are female. Assuming that two positions will be filled independently of each other, what is the probability that both positions are filled by females?
5. A family is going shopping for a new van. The probability that the family will purchase a Ford van is 0.33, a Chevy van is 0.25, a Dodge van 0.20, and a Toyota van 0.22. The probability that the family purchases a Toyota van or a Ford van or a Chevy van is:
 - a. $.33 \times .22 \times .25$
 - b. $1 - .33 \times .22 \times .25$
 - c. $.33 + .22 + .25$
 - d. $1 - (.33 + .22 + .25)$
 - e. None of the above
6. Suppose there are 60 students in a statistics class of which 24 are female. If three students are selected without replacement to work problems at the board, what is the probability that all three of the students chosen are female?
7. The probability that a new tire will have a blowout in the first year is 0.10. If the four tires on a new car function independently of each other, what is the probability that at least one tire blows out in the first year?
 - a. $.10 \times .10 \times .10 \times .10$
 - b. $1 - (.10 \times .10 \times .10 \times .10)$
 - c. $.90 \times .90 \times .90 \times .90$
 - d. $1 - (.90 \times .90 \times .90 \times .90)$
 - e. None of the above

8. A complex electronic device contains three components, A, B, and C. The probabilities of failure for each component in any one year are 0.01, 0.03, and 0.04, respectively. If any one component fails, the device will fail. Assuming the components fail independently of one another, what is the probability that the device will **not** fail in one year?

- A. Less than 0.01
- B. 0.078
- C. 0.080
- D. 0.922
- E. Greater than 0.99

9. A large store has a customer service department where customers can go to ask for help with store-related issues. According to store records, approximately twenty-five percent of all customers who go to the service department ask for help finding an item. Assume the reason each customer goes to the service department is independent from customer to customer. Based on the approximation, what is the probability that at least 1 of the next 4 customers who go to the service department will ask for help finding an item?

- A. $4\left(\frac{1}{4}\right)^2$
- B. $1 - \left(\frac{1}{4}\right)^2$
- C. $1 - \left(\frac{1}{4}\right)^4$
- D. $1 - \left(\frac{3}{4}\right)^4$
- E. $\left(\frac{4}{4}\right)\left(\frac{3}{4}\right)\left(\frac{2}{4}\right)\left(\frac{1}{4}\right)$

10. A tropical storm is classified as major if it has sustained winds greater than 110 miles per hour. Based on data from the past two decades, a meteorologist estimated the following percentages about future storms.

- 20% of all tropical storms will originate in the Atlantic Ocean, of which 20% will be classified as major.
- 30% of all tropical storms will originate in the eastern Pacific Ocean, of which 15% will be classified as major.
- 50% of all tropical storms will originate in the western Pacific Ocean, of which 25% will be classified as major.

Based on the meteorologist's estimates, approximately what is the probability that a future tropical storm will originate in the Pacific Ocean and be classified as major?

- A. 0.045
- B. 0.125
- C. 0.170
- D. 0.400
- E. 0.960

11. A marketing survey indicates that 60% of the population owns an automobile, 30% owns a house, and 20% owns both an automobile and a house. Calculate the probability that a person chosen at random owns an automobile or a house, but not both.
- 12.. The probability that a visit to a primary care physician's (PCP) office results in neither lab work nor referral to a specialist is 35%. Of those coming to a PCP's office, 30% are referred to a specialist and 40% require lab work. Determine the probability that a visit to a PCP's office results in both lab work and referral to a specialist.
- a. 0.05 b. 0.12 c. 0.18 d. 0.25 e. 0.35

Use the following scenario to answer questions 13 to 15: A psychologist studied the number of puzzles that subjects were able to solve in a five-minute period while listening to soothing music. Let X be the number of puzzles completed successfully by a random chosen subject. The following probability distribution for X was found:

X	1	2	3	4
$P(X)$	0.2	0.4	0.3	0.1

13. What type of random variable is being defined? Is this a valid probability distribution? Why or why not?
14. What is the probability that a randomly chosen subject completes more than the expected number of puzzles in the five-minute period?
15. What are the values for σ_X and σ_X^2 or $(\sigma_X)^2$ for the random variable X ?

Please also complete the 3 problem sets of *Multiple Choice Questions*

FREE Response Question

A grocery store purchases melons from two distributors, J and K. Distributor J provides melons from organic farms. The distribution of the diameters of the melons from Distributor J is approximately normal with mean 133 millimeters (mm) and standard deviation 5 mm.

- (a) For a melon selected at random from Distributor J, what is the probability that the melon will have a diameter greater than 137 mm?

Distributor K provides melons from nonorganic farms. The probability is 0.8413 that a melon selected at random from Distributor K will have a diameter greater than 137 mm. For all the melons at the grocery store, 70 percent of the melons are provided by Distributor J and 30 percent are provided by Distributor K.

- (b) For a melon selected at random from the grocery store, what is the probability that the melon will have a diameter greater than 137 mm?
- (c) Given that a melon selected at random from the grocery store has a diameter greater than 137 mm, what is the probability that the melon will be from Distributor J?