

Directions: Do all of your work on these sheets. Write sequentially and show all work.

Part 1: Multiple Choice. Circle the letter corresponding to the best answer.

- An assignment of probability must obey which of the following?
 - The probability of any event must be a number between 0 and 1, inclusive.
 - The sum of all the probabilities of all outcomes in the sample space must be exactly 1.
 - The probability of an event is the sum of the outcomes in the sample space which make up the event.
 - All of the above.
 - A and B only.
- Event A occurs with probability 0.2. Event B occurs with probability 0.8. If A and B are disjoint (mutually exclusive), then
 - $P(A \text{ and } B) = 0.16$.
 - $P(A \text{ or } B) = 1.0$.
 - $P(A \text{ and } B) = 1.0$.
 - $P(A \text{ or } B) = 0.16$.
 - Both A and B are true.
- A fair coin is tossed four times, and each time the coin lands heads up. If the coin is then tossed 1996 more times, how many heads are most likely to appear for these 1996 additional tosses?
 - 996
 - 998
 - 1000
 - 1996
 - None of the above. The answer is _____.
- A die is loaded so that the number 6 comes up three times as often as any other number. What is the probability of rolling a 1 or a 6?
 - $1/3$
 - $1/4$
 - $1/2$
 - $2/3$
 - None of the above. The answer is _____.

Questions 5 and 6 relate to the following: In a particular game, a fair die is tossed. If the number of spots showing is either four or five, you win \$1. If the number of spots showing is six, you win \$4. And if the number of spots showing is one, two, or three, you win nothing. You are going to play the game twice.

- The probability that you win \$4 both times is
 - $1/6$
 - $1/3$
 - $1/36$
 - $1/4$
 - $1/12$

6. The probability that you win at least \$1 both times is
- (a) $1/2$
 - (b) $4/36$
 - (c) $1/36$
 - (d) $1/4$
 - (e) $3/4$

Question 7 and 8 relate to the following: An event A will occur with probability 0.5. An event B will occur with probability 0.6. The probability that both A and B will occur is 0.1.

7. The conditional probability of A given B
- (a) is 0.5.
 - (b) is 0.3.
 - (c) is 0.2.
 - (d) is $1/6$.
 - (e) cannot be determined from the information given.
8. We may conclude that
- (a) events A and B are independent.
 - (b) events A and B are disjoint.
 - (c) either A or B always occurs.
 - (d) events A and B are complementary.
 - (e) none of the above.
9. Experience has shown that a certain lie detector will show a positive reading (indicates a lie) 10% of the time when a person is telling the truth and 95% of the time when a person is lying. Suppose that a random sample of 5 suspects is subjected to a lie detector test regarding a recent one-person crime. Then the probability of observing no positive reading if all suspects plead innocent and are telling the truth is
- (a) 0.409
 - (b) 0.735
 - (c) 0.00001
 - (d) 0.591
 - (e) 0.99999
10. If you buy one ticket in the Provincial Lottery, then the probability that you will win a prize is 0.11. If you buy one ticket each month for five months, what is the probability that you will win at least one prize?
- (a) 0.55
 - (b) 0.50
 - (c) 0.44
 - (d) 0.45
 - (e) 0.56

Part 2: Free Response

Answer completely, but be concise. Write sequentially and show all steps.

11. Many fire stations handle emergency calls for medical assistance as well as those requesting fire fighting equipment. A particular station says that the probability that an incoming call is for medical assistance is 0.85. This can be expressed as $P(\text{call is for medical assistance}) = 0.85$.
- (a) Give a relative frequency interpretation of the given problem.

 - (b) What is the probability that a call is not for medical assistance?

 - (c) Assuming that successive calls are independent of one another, calculate the probability that two successive calls will both be for medical assistance.

 - (d) Still assuming independence, calculate the probability that for two successive calls, the first is for medical assistance and the second is not for medical assistance.

 - (e) Still assuming independence, calculate the probability that exactly one of the next two calls will be for medical assistance.

 - (f) Do you think that it is reasonable to assume that the requests made in successive calls are independent? Explain briefly.
12. Approximately 30% of the calls to an airline reservation phone line result in a reservation being made.
- (a) Suppose that an operator handles 10 calls. What is the probability that none of the 10 results in a reservation?

 - (b) What assumptions did you make in order to calculate the probability in (a)?

 - (c) What is the probability that at least one call results in a reservation being made?

13. May has applied to both Harvard and the University of Florida. She thinks the probability that Harvard will admit her is 0.4, the probability that Florida will admit her is 0.5, and the probability that both will admit her is 0.2.

(a) Make a Venn diagram with the probabilities given marked.

(b) What is the probability that neither university admits May?

(c) What is the probability that she gets into Florida but not Harvard?

14. Heart disease is the #1 killer today. Suppose that 8% of the patients in a small town are known to have heart disease. And suppose that a test is available that is positive in 96% of the patients with heart disease, but is also positive in 7% of patients who do not have heart disease. If a person is selected at random and given the test and it comes out positive, what is the probability that the person actually has heart disease?

I pledge that I have neither given nor received aid on this test: _____