Exam 1 review solution

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MULTIPLE CHOICE QUESTIONS (0.5x8=4)

1. On a December day, the probability of snow is 0.30. The probability of a cold day is 0.50. The probability of snow and cold weather is 0.15. Are snow and cold weather independent events?

   a. only if given that it snowed

   b. no

   c. yes

   d. only when they are also mutually exclusive

2. The symbol $\cap$ shows the

   a. union of events

   b. intersection of two events

   c. sum of the probabilities of events

   d. sample space

3. The symbol $\cup$ shows the

   a. union of events

   b. intersection of two events

   c. sum of the probabilities of events

   d. sample space

4. The multiplication law is potentially helpful when we are interested in computing the probability of

   a. mutually exclusive events

b. the intersection of two events

c. the union of two events

d. conditional events

5. The union of events A and B is the event containing

    a. all the sample points belonging to B or A

    b. all the sample points belonging to A or B

    c. all the sample points belonging to A or B or both

    d. all the sample points belonging to A or B, but not both

6. The union of two events with nonzero probabilities

    a. can not be less than one

    b. can not be one

    c. could be larger than one

    d. None of these alternatives is correct.

7. Events A and B are mutually exclusive. Which of the following statements is also true?

    a. A and B are also independent.

    b. $P(A \cup B) = P(A)P(B)$

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

    d. $P(A \cap B) = P(A) + P(B)$

8. In an experiment, events A and B are mutually exclusive. If $P(A) = 0.6$, then the probability of B

    a. can not be larger than 0.4

    b. can be any value greater than 0.6

    c. can be any value between 0 to 1

    d. can not be determined with the information given

PROBLEMS (SHOW WORK IN EVERY PROBLEM)

1. Assume you have applied for two scholarships, a Merit scholarship (M) and an Athletic scholarship (A). The probability that you receive an Athletic scholarship is 0.18 . The probability of receiving both scholarships is 0.11 . The probability of getting at least one of the scholarships is 0.3 .

   a. What is the probability that you will receive a Merit scholarship? A) 0.23

   b. Are events A and M mutually exclusive? Why or why not? Explain. A) N

   c. Are the two events A, and M, independent? Explain, using probabilities. A) N

   d. What is the probability of receiving the Athletic scholarship given that you have been awarded the Merit scholarship? A)11/23

   e. What is the probability of receiving the Merit scholarship given that you have been awarded the Athletic scholarship? A)11/18

2. A survey of a sample of business students resulted in the following information regarding the genders of the individuals and their selected major.

Selected Major

Gender	Management	Marketing	Others	Total
Male	40	10	30	80
Female	30	20	70	120
Total	70	30	100	200

a. Transform the above table to a probability table. (5 points)

A)

Gender	Management	Marketing	Others	Total
Male	0.2	0.05	0.15	0.4
Female	0.15	0.1	0.35	0.6
Total	0.35	0.15	0.5	1

b. What is the probability of selecting an individual who is majoring in Marketing? A) 0.15

c. What is the probability of selecting an individual who is majoring in Management, given that the person is female? A) 0.25

d. Given that a person is male, what is the probability that he is majoring in Management? A) 0.5

e. What is the probability of selecting a male individual? A) 0.4

3. Sixty percent of the student body at UTC is from the state of Tennessee (T), 30% percent are from other states (O), and the remainder constitutes international students (I). Twenty percent of students from Tennessee lives in the dormitories, whereas, 50% of students from other states live in the dormitories. Finally, 80% of the international students live in the dormitories.

   a. What percentage of UTC students lives in the dormitories? A) 0.35

   b. Given that a student lives in the dormitory, what is the probability that she/he is an international student? A)0.229

   c. Given that a student does not live in the dormitory, what is the probability that she/he is an international student? A) 0.0308

4. In a city, 60% of the residents live in houses and 40% of the residents live in apartments. Of the people who live in houses, 20% own their own business. Of the people who live in apartments, 10% own their own business. If a person owns his or her own business, find the probability that he or she lives in a house. A) 0.75

5. A statistics professor has noted from past experience that a student who follows a program of studying two hours for each hour in class has a probability of 0.9 of getting a grade of C or better, while a student who does not follow a regular study program has a probability of 0.2 of getting a C or better. It is known that 70% of the students follow the study program. Find the probability that a student who has earned a C or better grade, followed the program. A)≈ 0.913

6. If A and B are independent events with $P(A) = 0.65$ and $P(A \cap B) = 0.26$, then find the value of $P(B), P(B \mid A)$ and $P(A \cup B)$. A) 0.4 - 0.4- 0.79.

7. If $P(A) = 0.4, P(B \mid A) = 0.35, P(A \cup B) = 0.69$, then what is the value of $P(B)$? A) 0.43