



Benha University
1th Term (Nov. 2021)
Class: The second Year

Subject: probability and Statistics

Course Code: SC 446

Final Exam

نموذج إجابة



Faculty of Computers & AI

Date: 20/01/2022

Time: 3 hours

Total Marks: 75 Marks

Examiner(s): Prof. E. Badr

Answer the following questions [4 questions in 2 page]:

Question No. 1

[20 Marks]

a) How many different license plates are variable if each plate contains a sequence of three letters followed by three digits.



Solution:

There are 26 choices for each of the three letters and ten choices for each of the three digits. Hence, by the product rule there are a total of $26 \cdot 26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 = 17,576,000$ possible license plates.

b) In Statistics class, the teacher needs to have 20 students standing in a row. Among these 20 students, there are 12 boys, and 8 girls. How many different ways can they be arranged in a row if only their class level will be distinguished?

Solution:

$$n = 20, \quad n_1 = 12, \quad n_2 = 8$$
$$= \frac{n!}{n_1! n_2!} = \frac{20!}{12! 8!} = 125,970$$

c) A dice is loaded in such a way that an even number is twice as likely to occur as an odd number. If E is the event that a number less than 4 occurs on a single toss of the dice, find P(E)?

Solution:

$$S = \{1, 2, 3, 4, 5, 6\},$$

$$E = \{1, 2, 3\}$$

$$P(E) = \frac{1}{9} + \frac{2}{9} + \frac{1}{9} = \frac{4}{9}$$

We assign a probability of w to each odd number and a probability of $2w$ to each even number. Since the sum of the probabilities must be 1, we have $9w = 1$ or $w = 1/9$.

Question 2

[20 Marks]

a) A die is rolled twice. What is the probability that the sum equal 10, if you know that 1st element equal 6?

Solution: $A = \{46, 55, 64\}$, $B = \{61, 62, 63, 64, 65, 66\}$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{1/36}{6/36} = 1/6$$

$$P(A) = 3/36$$

$$P(B) = 6/36$$

$$P(A \cap B) = 1/36$$

$$(A \cap B) = \{64\}$$

b) If $P(A) = 0.2$, $P(B) = 0.3$ determine the following probabilities: if A, and B are independent

1- $P(A \cap B)$

2- $P(A \cup B)$

3- $P(A|B)$

Solution:

$$P(A \cap B) = P(A) * P(B) = 0.2 * 0.3 = 0.06$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.5 - 0.06 = 0.44$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{P(A) * P(B)}{P(B)} = P(A) = 0.2$$

Question 3

[20 Marks]

Box #1 contains 2 red balls and 3 blue balls; Box#2 contains 5 red balls and 2 blue balls. If the selection of two boxes is equally likely, and the selected ball was red, what is the probability that it is from Box#1?

Solution:

$$P(B_1) = P(B_2) = 0.5$$

R: read, B: blue

Find $P(B_1|R)$?

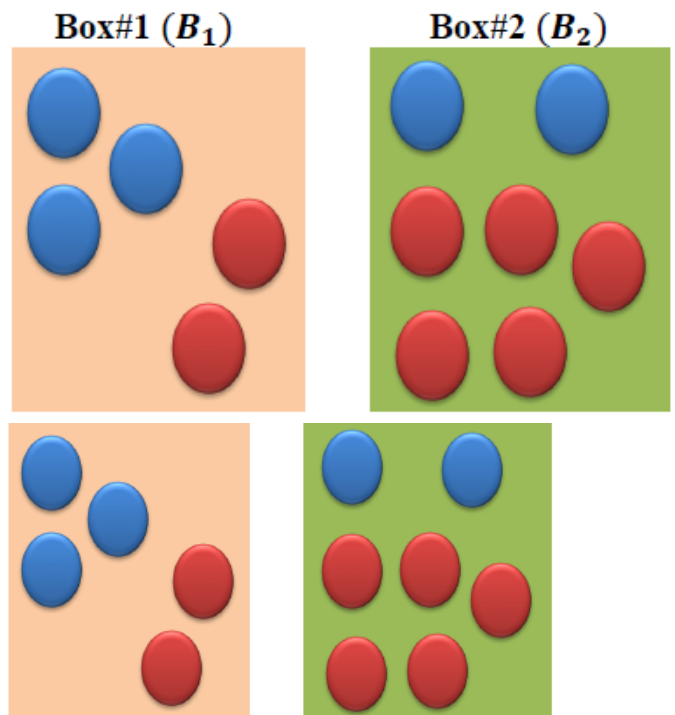
$$P(B_1) = P(B_2) = 0.5$$

R: read, B: blue

$$P(R|B_1) = \frac{2}{5} = 0.4$$

$$P(R|B_2) = \frac{5}{7} = 0.7143$$

$$P(B_1|R) = \frac{P(R|B_1)P(B_1)}{P(R)} = \frac{(0.4)(0.5)}{0.55715} = \frac{0.2}{0.55715} = 0.35897$$



Question No. 4

[5 Marks]

1) The sum of all probabilities equal to:

- a. 4
- b. 1**

- c. 3
- d. 2

2) The probability of each event lies between:

- a. 1 & 2
- b. 1 & 10
- c. 0 & 1
- d. 0 & 5

3) The probability of each event, when a coin is tossed for 1000 times with frequencies:
Head:455 & Tail: 545 is:

- a. 0.455 & 0.545
- b. 0.5 & 0.5
- c. 0.45 & 0.55
- d. 455 & 545

4) An event in the probability that will never be happened is called as -

- a. Unsure event
- b. Sure event
- c. Possible event
- d. Impossible event

5) What will be the probability of getting odd numbers if a dice is thrown?

- a. $\frac{1}{2}$
- b. 2
- c. $\frac{4}{2}$
- d. $\frac{5}{2}$

GOOD LUCK
Prof. Dr. E. Badr