

In-Class Test #1 - Module Probability and Statistics
Engineering Mathematics for Advanced Studies
IIT Dharwad
Autumn 2019

Time - 20 minutes

Maximum score - 20

Rule for absentee - Minimum 30% penalty, discuss reasons absense in person to get a chance for re-test.

Note:

1. Combination is represented as $\binom{n}{r}$ or nC_r for selecting r out of n
2. Permutation can be represented as nP_r for arranging r out of n
3. $P(A)$ expresses the probability of event A
4. Do not evaluate exact value unless stated explicitly. Provide the simplified formula or expression in terms of the variables. e.g.

$$\frac{\binom{10}{2}\binom{8}{3}}{\binom{10}{5}}$$

1. There are three vehicles that can accommodate 2,3, and 5 passengers each. A travelling group has 10 people. Please state number of possibilities in which they can split themselves for a journey. (Marks 4)

2. How many different words can be formed using all the 8 characters in the word "EMPLOYER"? (Marks 2)

- (a) $8!$
- (b) $7!$
- (c) $\frac{7!}{2!}$
- (d) $\frac{8!}{2!}$

ANSWER: _____

3. A dice has 3 colors, namely, Red(R) , Green (G), and Blue (B) such that same color is on its opposite faces. Outcome is the color that upper face shows up. Which *all* of the following options *can* be used to correctly state the sample space of a trial which involves throwing this dice twice (no partial score) (Marks 2)

- (a) $S = \{(R, R), (R, G), (R, B), (G, G), (G, B), (B, B)\}$

- (b) $S = \{(i, j) : i = 1 \text{ to } 6 \text{ and } j = 1 \text{ to } 6\}$
- (c) $S = \{(R, R), (R, G), (R, B), (G, R), (G, G), (G, B), (B, R), (B, G), (B, B)\}$
- (d) $S = \{(i, j) : i = 1 \text{ to } 3 \text{ and } j = 1 \text{ to } 3\}$

ANSWER: _____

4. If the outcome of the first throw being red is the event A in question 3 and outcome of the second throw being red is defined as event B

- (a) A and B are mutually exclusive events (TRUE or FALSE) (Marks 2)

ANSWER: _____

- (b) A and B are independent events (TRUE or FALSE) (Marks 2)

ANSWER: _____

5. With reference to above questions 3 and 4:

- (a) Can you state in words (single line sentence) what means by $P(A \cup B)$ for the experiment and outcomes stated in Q3 and Q4 (Marks 2)

ANSWER: _____

- (b) Can you state in words (single line sentence) what means by $P(A \cap B)$ for the experiment and outcomes stated in Q3 and Q4 (Marks 2)

ANSWER: _____

6. Which of the following are correct (TRUE or FALSE):

- (a) $P(A) = 1 - P(B)$ if $B = A^C$ (Marks 1)

ANSWER: _____

- (b) For any event A in any scenario, $0 < P(A) \leq 1$ (Marks 1)

ANSWER: _____

- (c) For mutually exclusive events A and B, $P(A \cap B) = P(A) + P(B) - P(A \cup B)$ (Marks 1)

ANSWER: _____

- (d) We can seat n people on a round dinner table in $(n - 2)!$ possible ways (in which atleast two neighbors would be different) (Marks 1)

ANSWER: _____