Department of Statistics and O. R.
College of Science
King Saud University

STAT 324 Test- I
Semester I, 1429 - 1430 H

Name of Student: _____ **Student's Number:** _____

Teacher's name: Dr. _____ **Section Number:** _____

Serial no. Attendance: _____

- Mobile Telephones are not allowed.
- Time allowed is 60 minutes.
- Attempt all questions.
- Choose the nearest number to your answer.

(3)

- For each question, put the code of the correct answer under the question number, in the table given below:

1	2	3	4	5	6	7	8	9	10
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**

»» For Q. 1 to 3,
Consider a bag with 4 red and 1 white balls.

(1) If we select two balls randomly without replacement, the probability that we get exactly one red ball is:

(A) 0.25	(B) 0.20	(C) 0.50	(D) 0.40	(E) none of these

(2) If we select two balls randomly without replacement, the probability that we get at least one red ball is:

(A) 0	(B) 1.0	(C) 0.5	(D) 0.4	(E) none of these

(3) If it is known that the first ball drawn is red, the probability that the second ball is red, is:

(A) 0.50	(B) 0.25	(C) 0.75	(D) 0.80	(E) none of these

»» For Q. 4 to 6,
Consider that a coin is so loaded that the probability of head is four times that of getting a tail. Suppose that such a coin is thrown three times,

(4) the probability of getting three heads is:

(A) 0.125	(B) 0.512	(C) 0.555	(D) 0.42	(E) none of these

(5) the events H (head on a single toss) and T (tail on a single toss) are:

(A) Mutually exclusive	(B) Overlapping	(C) Not independent	(D) Dependent	(E) none of these

(6) the number of sample points in the sample space is:

(A) 3	(B) 4	(C) 8	(D) 6	(E) none of these

»» For Q. 7 to 9,
Consider that in a group of 100 students, 30 take Physics; 40 take Math and 20 take both math and Physics. A student is chosen randomly from this group.

(7) The probability that he has taken neither Math nor Physics is:

(A) 0.30	(B) 0.50	(C) 0.54	(D) 0.42	(E) none of these

(8) The probability that he has taken at least one of the course Math or Physics is:

(A) 0.7	(B) 0.5	(C) 0.3	(D) 0.2	(E) none of these

(9) The probability that he has taken Math only is:

(A) 0.2	(B) 0.4	(C) 0.1	(D) 0.7	(E) none of these

»»» For Q. 10 to 12,

Suppose that in a country 40% of peoples are classified according to nationality A and 30% each are classified as nationality B and C. Past experience shows 10% of nationality A are involved in a certain crime while 10% and 20 % of nationality B and C respectively, are involved in that crime. A person from that country is randomly selected.

(10) The probability that the person is criminal, is:

(A) 0.100	(B) 0.333	(C) 0.130	(D)0.400	(E) none of these

(11) The probability that the person has nationality C, given that the person is criminal, is

(A) 0.462	(B) 0.200	(C) 0.060	(D) 0.538	(E) none of these

(12) If it is known that the selected person is criminal, so the probability that his nationality is A or B will be :

(A) 0.462	(B) 0.200	(C) 0.060	(D) 0.538	(E) none of these

»» For Q. 13 -15,

Suppose that a survey of 500 students was conducted. The survey asked questions about smoking habit and the name of college student studies. Results are shown in the table below. Suppose one person is chosen at random.

	College A	College B	Other College
Smoke	40	10	50
Do not smoke	80	40	280

(13) The probability that the selected student is in college A or B and he is a smoker.

(A) 0.10	(B) 0.20	(C) 0.50	(D) 0.26	(E) none of these

(14) The probability that the student is in college A or B or he is not a smoker.

(A) 0.20	(B) 0.38	(C) 0.32	(D) 0.90	(E) none of these

(15) The probability that the person does not smoke given that he is from other college is.

(A) 0.103	(B) 0.568	(C) 0.848	(D) 0.285	(E) none of these

»» For Q. 16 - 18,
let A and B be events defined on the same sample space such that $P(A \cap B^C) = 0.5$, $P(A \cap B) = 0.2$, and $P(A^C \cap B^C) = 0.1$

(16) Then $P(A)$ =

(A) 0.4	(B) 0.7	(C) 0.2	(D) 0.9	(E) none of these

(17) Then $P(A \cup B)$ =

(A) 0.9	(B) 0.1	(C) 0.4	(D) 0.7	(E) none of these

(18) The two events A and B are:

(A)dependent	(B) independent	(C) disjoint	(D) impossible	(E) none of these

(19) Suppose we want to form 3 digit numbers using only once the digits :
1, 2, 3, 4, 5 and 6. How many different 3 digit numbers can be formed ?

(A) 120	(B) 720	(C) 100	(D) 20	(E) none of these

(20) A pair of fair dice is tossed. The probability that a total of at most 9 will appear is:

(A) 10/36	(B) 1/9	(C) 8/9	(D) 5/6	(E) none of these

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① - D

Q2 → Q3

$P(RW) + P(WR)$

$= \frac{4}{5} \cdot \frac{1}{4} + \frac{1}{5} \cdot \frac{4}{4} = \frac{2}{5}$

or $P(X=1) = \frac{\binom{4}{1}\binom{1}{1}}{\binom{5}{2}} = \frac{4}{10} = \frac{2}{5}$

②

4	1
R	W

5

② - B

$P(X \geq 1) = P(X=1) + P(X=2)$

$= \frac{2}{5} + \frac{4}{5} \cdot \frac{3}{4} = 1$

③ - C

$P(R_2 | R_1) = \frac{P(R_1 R_2)}{P(R_1)} = \frac{\frac{4}{5} \cdot \frac{3}{4}}{\frac{4}{5}} = \frac{3}{4}$

④ - B

Q4 → Q6

$P(HHH) = \frac{4}{5} \cdot \frac{4}{5} \cdot \frac{4}{5} = \frac{64}{125}$

$P(H) = \frac{4}{5}$ $P(T) = \frac{1}{5}$

⑤ - A

events H, T are - mutually exclusive

⑥ - C

$n(S) = 2^3 = 8$

Q7 → Q9

A ... sr. take Physics
B ... sr. take Math

$P(A) = 0.3$
$P(B) = 0.4$
$P(A \cap B) = 0.2$

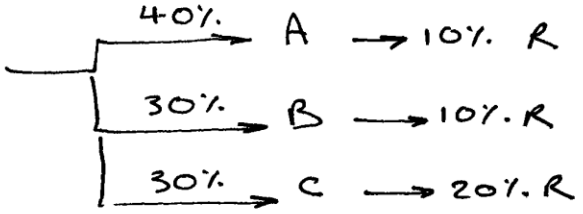
⑦ - B

⑦ $P(A^c \cap B^c) = 1 - P(A \cup B)$
$= 1 - [0.3 + 0.4 - 0.2] = 1 - 0.5 = 0.5$

⑧ $P(A \cup B) = 0.5$ **⑧** - B

⑨ $P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$ **⑨** - C

Q10 → Q12



(10) – C

(11) – A

(12) – D

(10) $P(R) = P(A)\,P(R|A) + P(B)\,P(R|B) + P(C)\,P(R|C)$

$= (0.4)(0.1) + (0.3)(0.1) + (0.3)(0.2)$

$= 0.13$

(11) $P(C|R) = \dfrac{P(C)\cdot P(R|C)}{P(R)} = \dfrac{(0.3)(0.2)}{0.13} = 0.462$

(12) $1 - P(C|R) = 0.538$

Q13 → Q15

	A	B	C	
S	40	10	50	100
N	80	40	280	400
	120	50	330	500

(13) – A

(14) – D

(15) – C

(13) $P(A \cap S) + P(B \cap S) = \dfrac{40}{500} + \dfrac{10}{500} = \dfrac{50}{500}$

(14) event: in college A or B prob. $= \dfrac{170}{500}$

event: not a smoker prob. $= \dfrac{400}{500}$

event: (in A or B) $\overset{\text{and}}{\cap}$ (not a smoker) $= \dfrac{120}{500}$

A or B or N prob. $= \dfrac{170}{500} + \dfrac{400}{500} - \dfrac{120}{500} = \dfrac{450}{500}$

(15) $P(N|C) = \dfrac{P(N \cap C)}{P(C)} = \dfrac{280/500}{330/500} = 0.848$

Q 16 – Q 18

$P(A \cap B^c) = 0.5$, $P(A \cap B) = 0.2$ $P(A^c \cap B^c) = 0.1$

(16) $P(A) = P(A \cap B^c) + P(A \cap B) = 0.7$

(16) – B

(17) $P(A \cup B) = 0.9$

$\therefore$ [illegible] $- P(A \cup B) = 0.1$

(17) – A

18 – A

(18) $P(A) = 0.7$, $P(B) = 0.4$, $P(A \cap B) = 0.2$

A, B dependent

19 – A

(19) $^6P_3 = \frac{6!}{3!} = 120$

20 – D

(20) X ... r.v. = total of two dice

$P(X \leq 9) = \frac{30}{36} = \frac{5}{6}$