بسم الله الرحمن الرحيم

Department of Statistics

& Operations Research

College of Science, King Saud University

STAT 324

First Midterm Exam

Second Semester

1430 – 1431 H

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	رقم التحضير		الرقم الجامعي
	اسم الدكتور		رقم الشعبة

- Mobile Telephones are not allowed in the classrooms.
- Time allowed is 90 minutes.
- Answer all questions.
- Choose the nearest number to your answer.
- WARNING: Do not copy answers from your neighbors. They have different questions forms.
- For each question, put the code of the correct answer in the following table beneath the question number:

1	2	3	4	5	6	7	8	9	10
A	C	C	D	B	A	D	B	A	D

11	12	13	14	15	16	17	18	19	20
B	B	D	C	A	C	A	B	B	C

21	22	23	24	25	26	27	28	29	30
A	A	C	B	D	C	A	D	D	A

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Suppose that the error in the reaction temperature, in ^0C , for a controlled laboratory experiment is a continuous random variable X having the function

$$f(x)=\begin{cases}\dfrac{8}{x^3}, & x>2\\ 0, & \text{elsewhere,}\end{cases},$$

then:

(1)	$P(X<4)$							
	(A)	**0.75**	(B)	3.0	(C)	0.50	(D)	0.15
(2)	$P(-1<X<4)$							
	(A)	3.0	(B)	0.15	(C)	**0.75**	(D)	0.5
(3)	$P(X\geq 5)$							
	(A)	1.0	(B)	0.15	(C)	**0.16**	(D)	0.5
(4)	The expected value of X; E(X) equals							
	(A)	2.0	(B)	1.0	(C)	8.0	(D)	**4.0**

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An investment firm offers its customers municipal bands that mature after different numbers of years. Given that cumulative distribution function of X, the number of years to maturity for a randomly selected bond is:

$$F(x)=\begin{cases}0 & x<1\\ 0.24 & 1\leq x<3\\ 0.56, & 3\leq x<5\\ 1, & x\geq 5\end{cases}$$

(5)	$P(X=5)$ equals to							
	(A)	0.76	(B)	**0.44**	(C)	0.56	(D)	0.20
(6)	$P(X>2)$							
	(A)	**0.76**	(B)	0.56	(C)	0.50	(D)	0.20
(7)	$P(1.5<X<5)$							
	(A)	0.2	(B)	0.76	(C)	0.56	(D)	**0.32**

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Suppose that $P(A_1)=0.4$, $P(A_1\cap A_2)=0.2$, $P(A_3|A_1\cap A_2)=0.75$, then:

(8)	$P(A_2|A_1)$ equals to							
	(A)	0.00	(B)	**0.50**	(C)	0.1	(D)	0.2
(9)	$P(A_1\cap A_2\cap A_3)$ equals to							
	(A)	**0.15**	(B)	0.75	(C)	1.0	(D)	0.2

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A certain group of adults are classified according to sex and their level of education as given by the following table:

Sex Education	Female	Male
College	17	22
Secondary	45	38
Elementary	50	28

If a person is selected at random from this group, then

(10)	The probability that the person is female is:							
	(A)	0.44	(B)	0.50	(C)	0.28	(D)	**0.56**
(11)	The probability that the person is female and has an elementary education is:							
	(A)	0.64	(B)	**0.25**	(C)	0.45	(D)	0.50

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Suppose that a certain institute offers two training programs T_1 and T_2. In the last year, 100 and 200 trainees were enrolled for programs T_1 and T_2, respectively. From the past experience it is known that the passing probabilities are 0.75 for the program T_1 and 0.80 for the program T_2. Assume that at the end of the last year we selected a trainee at random from this institute.

(12)	The probability that the selected trainee passed the program equals to							
	(A)	0.53	(B)	**0.78**	(C)	0.50	(D)	0.25
(13)	What is the probability that the selected trainee has been enrolled in the program T_2 given that he passed the program							
	(A)	0.80	(B)	0.32	(C)	0.78	(D)	**0.68**

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If $P(A)=0.9$, $P(B)=0.6$, and $P(A^C \cap B)=0.1$, then:

(14)	$P(A \cap B)$ equals to							
	(A)	0.30	(B)	0.40	(C)	**0.50**	(D)	0.20
(15)	$P(A \cup B)^C$ equals to							
	(A)	**0.00**	(B)	1.00	(C)	0.50	(D)	0.15
(16)	$P(A^c \mid B)$ equals to							
	(A)	0.10	(B)	0.50	(C)	**0. 17**	(D)	0.011
(17)	$P(B \mid A^c)$ equals to							
	(A)	**1.00**	(B)	0.011	(C)	0.50	(D)	0.017

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If $P(A)=0.8$, $P(B)=0.5$, and $P(A\ UB)=0.9$, then:

(18)	The two events A and B are							
	(A)	dependent	(B)	**independent**	(C)	disjoint	(D)	Mutually exclusive

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If the function $f(x) = C(x^2 + 3)$ for x = 0, 1, 2 can serve as a probability distribution of the discrete random variable X.

(19)	The value of C equals to							
	(A)	14	(B)	**0.071**	(C)	12	(D)	0.032

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Suppose that we have probability function $f(x) = 0.1x$, for x = 1, 2, 3, 4. Then

(20)	P(X >2) equals to							
	(A)	0.3	(B)	0.1	(C)	**0.7**	(D)	0.9
(21)	The expected value of X equals							
	(A)	**3.0**	(B)	2.5	(C)	0.25	(D)	0.5
(22)	The Variance of X equals							
	(A)	**1.0**	(B)	3.54	(C)	1.25	(D)	0.5

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If the random variable X has probability density

$$f(x) = \begin{cases} \dfrac{x^2}{3}, & k < x < 2 \\ 0, & \text{elsewhere} \end{cases}$$

(23)	Then the value of k equals							
	(A)	0.44	(B)	0.40	(C)	**-1.0**	(D)	0.23

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If the random variable X has probability density

$$f(x) = \left\{ \begin{array}{ll} 1+x, & -1 < x < 0 \\ 1-x & 0 \le x \le 1 \\ 0 & \text{elsewhere} \end{array} \right\}$$

(24)	P(X < 0.5) equals to							
	(A)	0.5	(B)	**0.875**	(C)	0.375	(D)	0.75
(25)	P(X = 0.2) equals to							
	(A)	1.2	(B)	0.5	(C)	0.8	(D)	**0**

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The cumulative distribution function F(x) of a continuous random variable X is as follows:

$$F(x) = \begin{cases} 0, & x \le -1 \\ \dfrac{x^3+1}{9}, & -1 < x < 2 \\ 1 & x \ge 2 \end{cases}$$

(26)	$P(-0.5 < X < 1.5)$ equals to							
	(A)	0.30	(B)	0.40	(C)	**0.39**	(D)	0.20
(27)	$P(X \ge 0.6)$ equals to							
	(A)	**0. 86**	(B)	0.14	(C)	0.50	(D)	0.15

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A random variable 'X' has E(X) = 2 and $E(X^2) = 8$. Another random variable 'Y' is related with X as follows:

Y = (3X + 5) /2.

(28)	The mean of Y is:							
	(A)	2.0	(B)	6.0	(C)	8.5	(D)	**5.5**
(29)	The Variance of Y is:							
	(A)	4.0	(B)	8.5	(C)	6.0	(D)	**9.0**

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A random variable 'X' has E(X) = 2, and variance = 4.

(30)	Then by Chebychev theorem, P(-1 < X < 5) is							
	(A)	**≥ 5/9**	(B)	≥ 4/9	(C)	≤ 5/9	(D)	≤ 4/9

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