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Department of Statistics
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STAT 324
Supplementary Examination
Second Semester
1424 - 1425

Student Name:			
Student Number:		Section Number:	
Teacher Name:		Serial Number:	

- Mobile Telephones are not allowed in the classrooms
- Time allowed is 2 hours
- Attempt all questions
- Choose the nearest number to your answer
- 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

11	12	13	14	15	16	17	18	19	20

21	22	23	24	25	26	27	28	29	30

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(1)	Two engines operate independently, if the probability that an engine will start is 0.4, and the probability that other engine will start is 0.6, then the probability that both will start is:							
	(A)	1	(B)	<u>0.24</u>	(C)	0.2	(D)	0.5

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(2)	If $P(B)=0.3$ and $P(A\|B)=0.4$, then $P(A\cap B)$ equal to;							
	(A)	0.67	(B)	<u>0.12</u>	(C)	0.75	(D)	0.3

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(3)	The probability that a computer system has an electrical failure is 0.15, and the probability that it has a virus is 0.25, and the probability that it has both problems is 0.20, then the probability that the computer system has the electrical failure or the virus is:							
	(A)	1.15	(B)	<u>0.2</u>	(C)	0.15	(D)	0.35

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Two brothers, Ahmad and Mohammad, are the owners and operators of a small restaurant. Ahmad and Mohammad alternate between the jobs of cooking and dish washing, so that at any time, the probability that Ahmad is washing the dishes is 0.50, and Mohammad is also 0.5. The probability that Mohammad breaks a dish is 0.40. On the other hand, the probability that Ahmad breaks a dish is only 0.10. Then,

(4)	the probability that a dish will be broken is:							
	(A)	0.667	(B)	0.25	(C)	0.8	(D)	0.5
(5)	If there is a broken dish in the kitchen of the restaurant. The probability that it was washed by Mohammad is:							
	(A)	0.667	(B)	0.25	(C)	0.8	(D)	0.5

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(6)	From a box containing 4 black balls and 2 green balls, 3 balls are drawn in succession, each ball being replaced in the box before the next draw is made. The probability of drawing 2 green balls and 1 black ball is:							
	(A)	6/27	(B)	2/27	(C)	12/27	(D)	4/27

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(7)	The value of k, that makes the function $f(x)=k\binom{2}{x}\binom{3}{3-x}$ For x=0,1,2 serve as a probability distribution of the discrete random variable X;							
	(A)	1/10	(B)	1/9	(C)	1	(D)	1/7

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The cumulative distribution of a discrete random variable, X, is given below:

$$F(x) = \begin{cases} 0 & \text{for } x < 0 \\ 1/16 & \text{for } 0 \le x < 1 \\ 5/16 & \text{for } 1 \le x < 2 \\ 11/16 & \text{for } 2 \le x < 3 \\ 15/16 & \text{for } 3 \le x < 4 \\ 1 & \text{for } x \ge 4. \end{cases}$$

(8)	the $P(X=2)$ is equal to:							
	(A)	3/8	(B)	11/16	(C)	10/16	(D)	5/16
(9)	the $P(2 \le X < 4)$ is equal to:							
	(A)	20/16	(B)	11/16	(C)	10/16	(D)	5/16

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(10)	The proportion of people who respond to a certain mail-order is a continuous random variable X that has the density function $f(x) = \begin{cases} \frac{2(x+2)}{5}, & 0 < x < 1, \\ 0, & \text{elsewhere.} \end{cases}$ Then, the probability that more than ¼ but less than ½ of the people contacted will respond to the mail-order is:							
	(A)	19/80	(B)	1/2	(C)	1/4	(D)	81/400

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Suppose the failure time (in hours) of a specific type of electrical device is distributed with a probability density function:

$$f(x) = \frac{1}{50}x \quad ,0 < x < 10$$

then,

(11)	the average failure time of such device is:							
	(A)	6.667	(B)	1.00	(C)	2.00	(D)	5.00
(12)	the variance of the failure time of such device is:							

	(A)	0	(B)	50	(C)	5.55	(D)	10

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A random variable X has a mean of 10 and a variance of 4, then, the random variable $Y = 2X - 2$,

(13)	has a mean of:							
	(A)	10	(B)	18	(C)	20	(D)	22
(14)	and a standard deviation of:							
	(A)	6	(B)	2	(C)	4	(D)	16

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(15) The probability distribution of X, the number of typing errors committed by a typist is:

x	0	1	2	3	4
$f(x)$	0.41	0.37	0.16	0.05	0.01

Then the average number of errors for this typist is:

	(A)	2	(B)	0.88	(C)	1.28	(D)	4

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If the random variable X has an exponential distribution with the mean 4, then

(16)	$P(X < 8)$ equals to:							
	(A)	0.2647	(B)	0.4647	(C)	0.8647	(D)	0.6647
(17)	the variance of X is:							
	(A)	4	(B)	16	(C)	2	(D)	1/4

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If the random variable X has a normal distribution with the mean 10 and the variance 36, then

(18)	the value of X above which an area of 0.2296 lie is:							
	(A)	14.44	(B)	16.44	(C)	10.44	(D)	18.44
(19)	the probability that the value of X is greater than 16 is:							

	(A)	0.9587	(B)	<u>0.1587</u>	(C)	0.7587	(D)	0.0587

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(20)	Suppose that the marks of the students in a certain course are distributed according to a normal distribution with the mean 65 and the variance 16. A student fails the exam if he obtains a mark less than 60. Then the percentage of students who fail the exam is:							
	(A)	20.56%	(B)	90.56%	(C)	50.56%	(D)	<u>10.56%</u>

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In a certain industrial facility accidents occur infrequently. If the probability of an accident on a given day is p, and accidents are independent of each other. **If p = 0.2**, then

(21)	probability that within seven days there will be at most two accidents will occur is:							
	(A)	<u>0.7865</u>	(B)	<u>0.4233</u>	(C)	0.5767	(D)	0.6647
(22)	probability that within seven days there will be at least three accidents will occur is:							
	(A)	0.7865	(B)	0.2135	(C)	0.5767	(D)	0.1039
(23)	the expected number of accidents to occur within this week is:							
	(A)	<u>1.4</u>	(B)	0.2135	(C)	2.57	(D)	0. 59

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The number of traffic accidents per week in a small city has a Poisson distribution with mean equal to 1.3. Then,

(24)	the probability of at least two accidents in 2 weeks is:							
	(A)	0.2510	(B)	0.3732	(C)	0.5184	(D)	<u>0.7326</u>
(25)	the standar diviation of traffic accidents per week in the small city is:							
	(A)	<u>1.14</u>	(B)	1.30	(C)	1.69	(D)	3.2

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A study was made by a taxi company to decide whether the use of new tires (A) instead of the present tires (B) improves fuel economy. Six cars were equipped with tires (A) and driven over a prescribed test course. Without changing drivers and cares, test course was made with tires (B). The gasoline consumption, in kilometers per liter (km/L), was recorded as follows: (assume the population to be normally distributed with unknown variances and are equals)

Car	1	2	3	4	5	6
Type (A)	4.5	4.8	6.6	7.0	6.7	4.6
Type (B)	3.9	4.9	6.2	6.5	6.8	4.1

(26)	A 95% confidence interval for the true mean gasoline brand A consumption is:				
	(A)	$\underline{4.462 \le \mu_A \le 6.938}$	(B)	$2.642 \le \mu_A \le 4.930$
	(C)	$5.2 \le \mu_A \le 9.7$	(D)	$6.154 \le \mu_A \le 6.938$
(27)	A 99% confidence interval for the difference between the true mean of type (A) and type (B)($\mu_A - \mu_B$) is:				
	(A)	$\underline{-1.939 \le \mu_A - \mu_B \le 2.539}$	(B)	$-2.939 \le \mu_A - \mu_B \le 1.539$
	(C)	$0.939 \le \mu_A - \mu_B \le 1.539$	(D)	$-1.939 \le \mu_A - \mu_B \le 0.539$

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A food company distributes two brands of milk. If it is found that 80 of 200 consumers prefer brand A and that 90 of 300 consumers prefer brand B,

(28)	96% confidence interval for the true proportion of brand (A) is:			
	(A)	$0.328 \le p_A \le 0.375$	(B)	$0.228 \le p_A \le 0.675$
	(C)	$\underline{0.328 \le p_A \le 0.475}$	(D)	$0.518 \le p_A \le 0.875$
(29)	A 99% confidence interval for the true difference in the proportion of brand (A) and (b), is:			
	(A)	$0.0123 \le p_A - p_B \le 0.212$	(B)	$-0.2313 \le p_A - p_B \le 0.3612$
	(C)	$\underline{-0.0023 \le p_A - p_B \le 0.012}$	(D)	$-0.0123 \le p_A - p_B \le 0.212$
(30)	If the value of α decrease (get smaller), then the interval estimate will decrease (get smaller);			
	(A) Yes	(B) No	(C) No change	