Department of Statistics & Operations Research
College of Science, King Saud University

STAT 324
Final Examination
Second Semester 1431 – 1432 H

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INSTRUCTIONS:

- Answer all questions.
- Do not copy answers from your neighbors; they have different question forms.
- Mobile Telephones are not allowed in the classroom.
- Time allowed is 3 Hours
- For each question, put the code of the correct answer in the following table beneath the question number. Please use capital letters: A, B, C, and D.

1	2	3	4	5	6	7	8	9	١٠

11	12	13	14	١5	١6	١7	١8	١9	٢٠

21	22	٢3	٢4	٢5	٢6	٢7	28	٢9	٣٠

31	32	33	34	35	36	٣7	38	39	40

41	٤2	٤3	44	45	٤6	47	٤8	٤9	٥٠

Term Marks	Final Exam. Marks	Total Marks

QUESTION (1)

Let X be a continuous random variable with probability density function given by:

$$f(x)=\begin{cases}2(1-x), & 0<x<1\\ 0, & elswhere\end{cases}$$

(1) The expected value of X [$\mu = E(X)$] equals:

(A) 0.25	(B) 2.25	(C) 0.33	(D) 0.50

(2) The variance of X [$\sigma^2 = Var(X)$] equals

(A) 0.056	(B) 0.113	(C) 0.037	(D) 0.333

(3) The value of the probability $P(X=0.5)$) equals:

(A) 1	(B) 0.5	(C) 0.1	(D) 0

(4) The value of the probability $P(X<0.5)$ equals:

(A) 0.25	(B) 0.75	(C) 0.50	(D) 1.25

(5) The value of the probability $P(0.5<X<1)$ equals:

(A) 0.64	(B) 0.45	(C) 0.25	(D) 0.75

(6) The cumulative distribution function [F(x)] for 0 <x <1, equals:

(A) (2-x)	(B) x(2-x)	(C) x-2	(D) $x(x^2-1)$

QUESTION (2)

Suppose that a survey of 500 parents was conducted. The survey asked questions about whether or not the person had a child in college and about the cost of attending college. Results are shown in the table below.

	Cost Too Much (M)	Cost Just Right (R)	Cost Too Low (L)
Child in College (A)	150	65	5
Child not in College (B)	100	125	55

Suppose one person is chosen at random, then

(7) The probability that the person thinks college cost is just right given that he has a child in college equals:

(A) 0.512	(B) 0.295	(C) 03.384	(D) 0.842

(8) the probability that the person does not have a child in college and he thinks that the college cost is too low equals:

(A) 0.11	(B) 0.20	(C) 0.917	(D) 0.25

(9) the probability that the person thinks college cost is too low given that he does not have a child in college equals:

(A) 0.242	(B) 0.38	(C) 0.57	(D) 0.38

QUESTION (3)

Suppose that a factory has two machines: machine A and machine B. These machines make widgets. Machine A makes 800 per day and 1% of these are defective. Machine B makes 200 per day of which 2% are defective. If we select a widget product by the factory, then:

(10) the probability that a widget produced by the factory will be defective equals:

(A) 0.02	(B) 0.012	(C) 0.8	(D)0.03

(11) the probability that the widget is produced by machine A, given that it is defective equals:

(A) 0.9	(B) 0.333	(C) 0.03	(D) 0.667

QUESTION (4)

Consider the following probability function:

x	0	1	2	3
f(x)= P(X=x)	0.216	0.432	0.288	0.064

(12) The mean (expected value) equals:

(A) 1.5	(B) 0.25	(C) 1.2	(D) 1.8

(13) The variance equals:

(A) 0.72	(B) 2	(C) 2.16	(D) 1.25

(14) The P(X <2) equals:

(A) 0.288	(B) 0.432	(C) 0.648	(D) 0.936

QUESTION (5)

Let X and Y be two independent random variables such that $\mu_X = 1$, $\sigma_X^2 = 2$, $\mu_Y = -2$, and $\sigma_Y^2 = 1$

(15) The value of E(X-3Y+1) is equals:

(A) 11	(B) 8	(C) 38	(D) 40

(16) The value of Var(X-3Y+1) is equals:

(A) 11	(B) 8	(C) 20	(D) 6

(17) The value of $E(Y^2)$ is equals:

(A) 1	(B) 2	(C) 0.8	(D) 5

(18) The highest lower bound for P(-4 < Y < 0) is:

(A) 1.0	(B) 0.25	(C) 0.5	(D) 0.75

QUESTION (6)

Suppose that 15 % of new residential central air conditioning units installed by a supplier need additional adjustments requiring a service call. Assume that a recent sample of 7 such units constitutes a Bernoulli process. Let X be the number of units among these 7 that need additional adjustments.

(19) The probability that exactly 2 units need additional adjustments equals::

(A) 0.156	(B) 1.05	(C) 0.209	(D) 0.16

(20) The probability that at least one units need additional adjustments equals:

(A) 0.152	(B) 0.679	(C) 1.052	(D) 0.163

(21) The mean number of units that need additional adjustments equals:

(A) 0.15	(B) 0.32	(C) 1.05	(D) 0.16

(22) the variance of X equals:

(A) 0.5892	(B) 0.2598	(C) 0.5298	(D) 0.8925