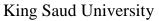Department of Statistics & Operations Research
College of Science
King Saud University
STAT-324: Probability and Statistics for Engineers
Second Mid-Term Exam
Summer Semester 1436 – 1437

Student's Name (In Arabic):		Section's Number:	
Student's Number:		Attendance number:	
Teacher's Name:			

Instructions:

- There are 25 multiple choice questions.
- Time allowed is 90 minutes (1.5 Hour).
- 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.
- Do not copy answers from your neighbors; they have different question forms.
- Mobile Telephones are not allowed in the classroom.

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

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

21	22	23	24	25
B	C	D	A	B

Question (1-5)

Suppose that the number of accidents occurring on a highway each day follows Poisson distribution with mean 3. Then

(1) the probability that 3 or more accidents occur today is:

| **(A)** | **0.5768** | (B) | 0.3528 | (C) | 0.6472 | (D) | 0.4232 |

(2) the probability that at most 5 accidents occur today is:

| (A) | 0.8253 | **(B)** | **0.9161** | (C) | 0.1847 | (D) | 0.0839 |

(3) the probability that from 9 to 10 accidents occurin 3 days is:

| (A) | 0.0836 | (B) | 0.1186 | **(C)** | **0.2503** | (D) | 0.5903 |

(4) The standard deviation of the number of accidents occur in 3 days is:

| **(A)** | **3** | (B) | 6 | (C) | 9 | (D) | 12 |

(5) The expected number of accidents occur in 30 days is:

| (A) | 30 | (B) | 60 | **(C)** | **90** | (D) | 120 |

Question (6- 10)

In the manufacture of car tyres, a particular production process is known to yield 10 tyres with defective walls in every batch of 100 tyres produced. From a production batch of 100 tyres, a sample of 4 tyres is selectedwithout replacement for testing to destruction. Then

(6) the probability that the sample contains no defective tyres is:

| (A) | 0.5052 | **(B)** | **0.6516** | (C) | 0.3483 | (D) | 0.4816 |

(7) the probability that the sample contains at least 2 defective tyres is:

| (A) | 0.0231 | (B) | 0.8212 | **(C)** | **0.0488** | (D) | 0.9512 |

(8) the probability that the sample contains at most 2 defective tyres is:

| **(A)** | **0.9972** | (B) | 0.0082 | (C) | 0.1361 | (D) | 0.8639 |

(9) the expectation of the number of defectives in samples of size 4 is:

(A)	0.04	(B)	0.10	(C)	0.60	**(D)**	**0.40**

(10) the variance of the number of defectives in samples of size 4 is:

(A)	0.2320	(B)	0.6314	(C)	**0.3491**	(D)	0.3840

Question (11-15):

Suppose that in a certain country, 42% of the population have Type A blood. Consider taking a sample of size 4 at random. Let Y denote the number of persons in the sample with Type A blood. Then

(11) $P(Y = 0) =$

(A)	0.8868	(B)	0.0311	**(C)**	**0.1132**	(D)	0.9689

(12) $P(Y = 5) =$

(A)	**0**	(B)	1	(C)	0.4211	(D)	0.4490

(13) $P(1 < Y < 2) =$

(A)	0.0219	**(B)**	**0**	(C)	0.4490	(D)	0.5279

(14) $P(2 \leq Y < 4) =$

(A)	0.7179	**(B)**	**0.5279**	(C)	0.5590	(D)	0.2030

(15) The expected value (mean) of Y is:

(A)	1.50	**(B)**	**1.68**	(C)	2.08	(D)	3.82

Question (16-20)

The length of life (in months) of a hair dryer is a normal distribution with mean 96 and standard deviation 18.

(16) the probability that the dryer works up to 96 months is:

(A)	0.59	(B)	0.01	(C)	0.40	**(D)**	**0.50**

(17) The probability that the dryer works at least 4 years is:

(A)	0.5410	(B)	0.9210	(C)	**0.9962**	(D)	0.0038

(18) The manufacturer decides to guarantee the product for 5 years. Thepercentageof the product will fail to satisfy the guarantee is:

| (A) | 97.72% | **(B)** | **2.28%** | (C) | 59.16% | (D) | 36.15% |

(19) The manufacturer decides to replace only 1% of all hair dryers. Thenthe length of the guarantee is:

| **(A)** | **54.15 months** | (B) | 24.20 months | (C) | 43.71 months | (D) | 36.50 months |

(20) In a sample of 5 dryers, the probability that four of them will be working at least 96 months is:

| (A) | 0.9813 | (B) | 0.0187 | (C) | 0.8487 | **(D)** | **0.1563** |

Question (21-23)

The time (in hours) required to repair a machine is an exponentially distributed random variable with mean equal 2 hours. Then

(21) The standard deviation of the time required to repair the machine is:

| (A) | 4 hours | **(B)** | **2 hours** | (C) | 0.5 hours | (D) | 0.25 hours |

(22) the probability that a repair time exceeds 2 hours is:

| (A) | 0.0130 | (B) | 0.6321 | **(C)** | **0.3679** | (D) | 0.7121 |

(23) the probability that a repair time is between 1 and 3 hours is:

| (A) | 0.0217 | (B) | 0.1170 | (C) | 0.1641 | **(D)** | **0.3834** |

Question (24-25)

You arrive at the bus station at 10 o'clock, knowing that the bus will arrive at some time uniformly distributed between 10 and 10:30. Then

(24) the probability that you will have to wait longer than 10 minutes is:

| **(A)** | **0.67** | (B) | 0.30 | (C) | 0.25 | (D) | 0.5 |

(25) the expected values of the waiting time is:

| (A) | 10 minutes | **(B)** | **15 minutes** | (C) | 25 minutes | (D) | 30 minutes |