بسم الله الرحمن الرحيم

Department of Statistics
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College of Science
King Saud University

STAT 324

Final Examination

First Semester
1426 - 1427

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

- Mobile Telephones are not allowed in the classrooms
- Time allowed is 3 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**

31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**

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1) Two engines operate independently, if the probability that an engine will start is 0.3, and the probability that other engine will start is 0.5, then the probability that both will start is:

(A) 1	(B) 0.15	(C) 0.24	(D) 0.5

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2) Assume that $P(A)=0.2$, $P(B)=0.4$, $P(A\cap B\cap C)=0.05$, and $P(\overline{A\cap B})=0.92$, then the event A and B are,

(A) Independent	(B) Dependent	(C) Disjoint	(D) None of these.

3) Using question (2), $P(C|A\cap B)$ is equal to,

(A) 0.604	(B) 0.625	(C) 0. 054	(D) –0.925

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4) A company in Riyadh has 100 cars, 0.46 are white. Of the cars that aren't white, 0.40 are green. How many company cars are neither white nor green (not white or not green)?

(A) 67	(B) 54	(C) 14	(D) 20

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Suppose there is a factory with three assembly lines (A, B, and C) that each make the same part. 50% of parts produced by the factory come off of assembly line A, 30% come off of assembly line B, and 20% come off of assembly line C. Finished parts can be categorized as either defective or not. It is known that 0.4% of the parts from line A are defective, 0.6% of the parts from line B are defective, and 1.2% of the parts from line C are defective.

5) The probability of selecting a defective part is equal to:

(A) 0.323	(B) 0.290	(C) 0.387	(D) 0.006

6) Suppose that we are holding a defective part in our hand, the probability that it came from assembly line A?

(A) 0.323	(B) 0.290	(C) 0.387	(D) 0.006

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7) A lower bound valued according to chebyshev's theory for $P(\ \mu\ -3\sigma \le X \le \mu\ +3\sigma\ )$ equal to:

(A) 0.3175	(B) 0.750	(C) 0.889	(D) 0.250

8) If Y= 3X - 1.5 and E(X)= 0.5, then E(Y) is:

(A) – 0.5	(B) 0.5	(C) 0.0	(D) None of these.

9) If Y= 3X - 1.5 and V (X)= 0.4, then V(Y) is:

(A) 0.6	(B) 3.6	(C) 0. 3	(D) –0.9

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10) Consider the probability function $f(x)=kx,\ \ 0<x<1$. Then the value of $\boldsymbol{k}$ is equal to:

(A) 2	(B) 1	(C) 0.1	(D) 0.2

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11) Consider the probability function $f(x)=cx,\ \ x=1,2,3,4$. Then the value of $\boldsymbol{c}$ is equal to:

(A) 2	(B) 1	(C) 0.1	(D) 0.2

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Let X be a random variable have a discrete uniform with parameter *k*=3 and with values 0,1, and 2.

12) The mean of X is:

(A) 1.0	(B) 2.0	(C) 1.5	(D) 0.0

13) The variance of X is

(A) 0.0	(B) 1.0	(C) 0.67	(D) 1.33

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A study by the traffic police claims that only 20% of the drivers in Riyadh fasten their seat belts. A sample of 10 drivers in Riyadh has been taken. (Hint: X is a binomial variable.)

14) the probability of observing 2 or less drivers in Riyadh fasten their seat belts is equal to:

(A) 0	(B) 0.107	(C) 0.376	(D) 0.678

15) the probability of observing more than 2 drivers in Riyadh fasten their seat belts is equal to:

(A) 0.322	(B) 0.107	(C) 0.376	(D) 0.678

16) the probability of observing exactly 2 drivers in Riyadh fasten their seat belts is equal to:

(A) 0.322	(B) 0.302	(C) 0.376	(D) 0.268

17) the probability of observing between 2 and 8 drivers in Riyadh fasten their seat belts is equal to:

(A) 0.678	(B) 0.624	(C) 0.376	(D) 0.322

18) the expected number of drivers in Riyadh that fasten their seat belts is equal to:

(A) 2	(B) 4	(C) 10	(D) 1.8

19) the variance of the number of drivers in Riyadh that fasten their seat belts is equal to:

(A) 2	(B) 4	(C) 10	(D) 1.8

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Suppose that the number of telephone calls received per day has a Poisson distribution with mean of 3 calls per day.

20) The probability that 2 calls will be received in a given day is

(A) 0.546	(B) 0.646	(C) 0.149	(D) 0.224

21) The expected number of telephone calls received in a given week is

(A) 3	(B) 21	(C) 18	(D) 15

22) The probability that at least 2 calls will be received in a period of 12 hours is

(A) 0.594	(B) 0.191	(C) 0.809	(D) 0.442

▸▸ ▸▸

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,

23) the average failure time of such device is:

(A) 6.667	(B) 1.00	(C) 2.00	(D) 5.00

24) the variance of the failure time of such device is:

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

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Suppose the failure time (in hours) of a specific type of electrical insulation in an experiment in which the insulation was subjected to a continuously increasing voltage stress is distributed with a probability density function:

$$f(x) = \frac{1}{70} e^{-x/70}, \quad x > 0,$$

then,

25) the probability that a randomly selected insulation will be less than 50 hours is:

(A) 0.4995	(B) 0.7001	(C) 0.5105	(D) 0.2999

26) the probability that a randomly selected insulation will last more than 150 hours is:

(A) 0.8827	(B) 0.2788	(C) 0.1173	(D) 0.8827

27) the average failure time of the electrical insulation is:

(A) 1/70	(B) 70	(C) 140	(D) 35

28) the variance of the failure time of the electrical insulation is:

(A) 4900	(B) 1/49000	(C) 70	(D) 1225

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The finished inside diameter of a piston ring is normally distributed with a mean of 12 centimeters and a standard deviation of 0.03 centimeter. Then,

29) the probability of rings that will have inside diameter less than 12.05 centimeters is:

(A) 0.0475	(B) 0.9525	(C) 0.7257	(D) 0.8413

30) the probability of rings that will have inside diameter exceeding 11.97 centimeters is:

(A) 0.0475	(B) 0.8413	(C) 0.1587	(D) 0.4514

31) the probability that a piston ring will have an inside diameter between 11.95 and 12.05 centimeters is:

(A) 0.905	(B) -0.905	(C) 0.4514	(D) 0.7257

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A machine is producing metal pieces that are cylindrical in shape. A sample is taken and the diameters are 1.70, 2.11, 2.20, 2.31 and 2.28 centimeters. Then,

32) The sample mean is:

(A) 2.22	(B) 2.32	(C) 2.90	(D) 2.12

33) The sample variance is:

(A) 0.597	(B) 0.285	(C) 0.061	(D) 0.534

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A certain engineer is interested in the proportion of defective items in the population. In a random sample of 1000 items 250 are found to be defective.

34) The point estimate for the true proportion of homes in the population with a VCR is:

(A) 250	(B) 1000	(C) 0.25	(D) 4

35) The upper bound of the 95% confidence interval estimate for the true proportion is:

(A) 0.226	(B) 0.277	(C) 0.295	(D) 0.567

36) The lower bound of the 95% confidence interval estimate for the true proportion is:

(A) 0.217	(B) 0.223	(C) 0.285	(D) 0.567

37) If the value of α decrease (get smaller), then the interval estimate will decrease (get smaller).

(A) Yes	(B) No	(C) No change

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A company surveyed television viewers in an effort to estimate the proportion of homes with a video cassette recorder (VCR). A survey of 600 homes found 470 with a VCR. Representatives of the VCR industry claim that the true proportion of homes with a VCR is 0.80. Test this hypotheses using α=0.05, we get:

38) the following hypotheses:

(A)	(B)	(C)	(D)
H : p=0.80 VS H_1:p≠0.8	H : p=0.80 VS H_1:p>0.80	H : p=0.80 VS H_1:p<0.80	H : p≠0.80 VS H_1:p0=.80

39) Our decision will be:

(A)	(B)	(C)	(D)
Accept H (Don't reject H)	Reject H	Don't reject H_1	Reject H and H_1

40) Suppose the company wish to have a sampling error of plus or minus 0.1 in estimating the proportion of homes with a VCR at the 95% confidence level. The sample size required is equal to:

(A) 600	(B) 66	(C) 660	(D) 60

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An investigation of a photocopying equipment show that 60 failures of equipment took on the average 84.2 minutes to repair with a standard deviation of 19.4 minutes. Find 95% confidence interval for the true mean μ of repairing the equipment?

41) The point estimate for the true mean μ of repairing the equipment is equal to:

(A) 60	(B) 84.2	(C) 19.4	(D) 376.36

42) The upper bound of the 95% confidence interval for the true mean μ of repairing the equipment is equal to:

(A) 89.1	(B) 79.3	(C) 82.6	(D) 85.9

43) The lower bound of the 95% confidence interval estimate for the true mean μ of repairing the equipment is equal to:

(A) 89.1	(B) 79.3	(C) 82.6	(D) 85.9

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A random sample of size $n_1=31$ is taken from a normal population with standard deviation $\sigma_1=5$ has mean 80. A second random sample of size $n_2=36$ is taken from a different normal population with standard deviation $\sigma_2=3$ has mean equal to 75.

44) How large the sample size of the second population is needed if we want to be 95% confident that our sample mean will be within one (1) unit of the true mean μ_2?

(A) 6	(B) 35	(C) 138	(D) 85

45) The upper bound of the 99% confidence interval for the difference μ_1-μ_2 is equal to:

(A) 2.99	(B) 7.65	(C) 2.35	(D) 7.02

46) The lower bound of the 99% confidence interval for the difference $\mu 1$-$\mu 2$ is equal to:

(A) 2.99	(B) 7.65	(C) 2.35	(D) 7.02