Department of Statistics
and Operations Research
College of Science
King Saud University

STAT 324
Final Examination
First Semester
1425 – 1426

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

- Mobile Telephones are not allowed in the classrooms
- Time allowed is 3 hours
- Answer 40 questions only from 44 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**
B	D	D	A	B	C	D	B	A	D	B

12	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
B	A	D	E	E	A	C	E	A	A	B

23	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
A	C	D	B	B	C	C	D	A	A	E

34	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**
C	E	D	A	B	C	C	E	A	B	C

1. Consider the sample space S= {White, Black, Red, Blue, Yellow, Violet, Green} and the events A={White, Black, Green}, B= {Black, Red, Blue}, C={Violet}. Then the list of the elements of the set corresponding to the event $(A \cap B') \cup C'$ is:

(A) { Black, Violet}, (B) {White, Black, Red, Blue, Yellow, Green}, (C) {White, Black, Red, Blue, Yellow, Violet, Green}, (D) {White, Red, Blue, Yellow, Green}, (E) {White, Green, Violet}.

2. The number of ways to select 2 computers from 9 computers of the same brand is

(A)512 (B) 72 (C) 81 (D) 36 (E) 18

3. Among the 500 first year students of a college, 270 students study computer science, 345 students study mathematics, and 175 students study both computer science and mathematics. If one student is selected at random, then the probability that the student did not take either of these subjects is

(A) 0.88 (B) 0.65 (C) 0.77 (D) 0.12 (E) 0.35

⇒**<u>Use the following data to answer questions 4 and 5</u>**. A random sample of 2000 computers are classified according to brands A, B and C and levels of satisfaction of the owner, Good, Average and Poor as shown in the following table:

Level of Satisfaction	Brands A	B	C
Good	200	100	100
Average	400	300	300
Poor	100	200	300

4. If a computer is selected randomly, then the probability that the satisfaction level of the owner of the computer is poor, is:

(A) 0.300 (B) 0.1429 (C) 0.3333 (D) 0.428 (E) 0.1667

5. If the randomly selected computer gives a satisfaction level good to the owner, then the probability that the computer is of brand C ,is:

(A) 0.20 (B) 0.25 (C) 0.35 (D) 0.10 (E) 0.2858

6. The probability that you will leave home to attend your class on time (A) is 0.75; the probability that you will arrive at your class on time (L) is 0.60 and

the probability that you will leave home and arrive on time is 0.45. Then the two events, A and L are:

(A) Disjoint (B) Dependent (C) Independent
(D) Mutually Exclusive (E) None is correct

7. A certain defect (D) is present in about 1 out of 1000 cars during production [P(D)=0.001], and a program of testing is to be carried out using a detection device which gives a positive reading with probability 0.99 for a defective car [P(+/D)=0.99] and with probability 0.05 for a non-defective car [P(+/ND)=0.05]. If a randomly selected car has a positive reading then the probability that it actually does have the defect [P(D/+)] is:

(A) 0.04995 (B) 0.05094 (C) 0.00099 (D) 0.0194 (E) 0.99

8. If 50% of the automobiles sold by an agency for a certain car are equipped with diesel engines, let X represent the number of diesel models among the next 5 cars sold by this agency, then the probability distribution of X is

(A) $f(x)=\frac{\binom{5}{x}}{16}, x=0,1,2,3,4.$ (B) $f(x)=\frac{\binom{5}{x}}{32}, x=0,1,2,3,4,5.$

(C) $f(x)=\frac{\binom{4}{x}}{16}, x=0,1,2,3,4.$ (D) $f(x)=\frac{\binom{5}{x}}{32}, x=1,2,3,4.$

(E) $f(x)=\frac{\binom{5}{x}}{64}, x=0,1,2,3,4.$

⇒**For question 9, 10 and 11 .** Let X be a random variable with the following probability distribution function

x	-1	0	1	2
P(X=x)	0.3	0.35	0.1	0.25

9. the mean of X (E(X)) =
(A) 0.3 (B) 0.2 (C) 1.4 (D) 1.31 (E) 2.0

10. the variance of X =
(A) 0.3 (B) 0.2 (C) 1.4 (D) 1.3 1 (E) 2.0

11. P(X> -1)=
(A) 0.2 (B) 0.7 (C) 0.65 (D) 0.25 (E) 0.9

⇒**For question 12, 13 and 14 .** Consider a continuous random variables X with the following probability density function

$$f(x) = \frac{x^2}{9}, \quad 0< x <k,$$

12. the value of k is:
(A) 0.33 (B) 3.0 (C) 3.334 (D) 0.25 (E) 0.5

13. P(X<1)=
(A) 0.03704 (B) 0.02223 (C) 0.6555 (D) 0.254 (E) 0.22

14. E(X)=
(A) 2.20 (B) 2.22 (C) 2.65 (D)2.25 (E) 1.0

⇒**<u>Answer for question 15, 16 and 17.</u>** A random variables X has a mean μ=6 and a variance σ^2= 4.

15. E(3X+4)=
(A) 24.0 (B) 14.0 (C) 36.0 (D) 25.0 (E) 22.0

16. Var(3X+5)= σ^2_{3X+5}=
(A) 41.0 (B) 17.0 (C) 14.0 (D)22.0 (E) 36.0

17. P(-4<X<16)
(A) $\geq$ 24/25 (B) < 24/25 (C) >1/5 (D)<1/5 (E) $\geq$15/16

⇒**<u>Answer for question 18, 19, 20 and 21.</u>** A manufacture plant received a shipment of circuit boards from a manufacturer, 5 boards randomly chosen for inspection and determine whether they are defective or not. It is known that 8% of the boards in the shipment are defective.

18. The probability of no defective circuit boards is :
(A) 0.0544 (B) 0.3409 (C) 0.6591 (D) 0.9456 (E) 0.5566

19. The probability that more than 1 of the circuit boards is defective is:
(A) 0.7865 (B) 0.9456 (C) 0.6591 (D) 0.1039 (E) 0.0543

20. The variance for the number of defective boards is:
(A) 0.368 (B) 0.2135 (C) 0.5767 (D) 0.2052 (E) 0.4463

21.Suppose in this experiment, a shop receives 20 circuit boards out of which 6 are defective boards. If we buy 4 boards, then the probability that we will find 2 defective boards is:
(A) 0.2817 (B) 0.2135 (C) 0.5858 (D) 0.1039 (E) 0.3362

⇒**<u>Answer for question 22 and 23.</u>** In a certain industrial facility accidents occur. If the average number of accidents per a month is 2, then

22. probability that within a month there will be at most two accidents is:
(A) 0.7865 (B) 0.6767 (C) 0.4060 (D) 0.3233 (E) 0.6565

23. probability that within a month there will be at least one accidents is:

(A) 0.8647 (B) 0.2135 (C) 0.5767 (D) 0.1353 (E)0.2231

24. Given a standard normal distribution, then $z_{0.75}$ is

(A) 0.75 (B) 0.7734 (C) 0.675 (D) 0.25 (E) 0.11

25. If the variable X has normal with μ= 10 and σ^2=25, then the probability that of X-values exceeds 8 is:

(A) 0.80 (B) 0.20 (C) 0.10 (D) 0.6554 (E) 0.3446

⇒**<u>Answer for question 26 and 27</u>**. Suppose that X has the exponential density $f(x) = 0.25e^{-0.25x}$, then

26. the mean of X ($E(X)$) is:
(A) 0.25 (B) 4 (C) 0.0 (D) 0.25 (E) 2.0e

27. the probability $P(X \le 4)$ is:
(A) 0.3679 (B) 0.6321 (C) 0.5 (D) 0.0 (E) 0.3321

28. If the mean and the variance of weights of students in certain school is 35 kg and 25 kg^2. Then the probability that the average mean of weights will be greater than 34 kg in a sample of size 64 students is
(A) 0.0548 (B) 0.9542 (C) 0.9452 (D) 0.0450 (E)0.223

⇒**F<u>or question 29,30, 31, and 32.</u>**Consider following information. A sample of 25
men has a mean weight of 65 kg with a standard deviation of 8 kg. Suppose that the weight of men follows normal distribution with a standard deviation of 10 kg.

29. The population variance of sample means ($\sigma^2_{\overline{X}}$)is:

(A) 2 kg^2 (B) 1.6 kg^2 (C) 4 kg^2 (D) 2.56 kg^2 (E)0.4

30. The point estimate of μ is
(A) 10 kg (B) 8 kg (C) 25 kg (D) 65 kg (E) 9 kg

31. The lower 95% confidence limit for a population mean μ is
(A) 61.08 kg (B) 64.671kg (C) 61.864 kg (D) 61.698 kg (E) 7.3 kg

32. The upper 95% confidence limit for a population mean μ is
(A) 68.92 kg (B) 68.3024 kg (C) 68.29 kg (D) 72.84 kg (E) 8.22 kg

33. In a sample of 100 items, 8 were found defective. The lower 98% confidence limit for the population proportion is
(A) 0.08 (B) 8 (C) 0.024 (D) 0.075 (E) 0.0168

⇒**<u>For question 34 ,35 and 36.</u>** Consider following :

Let n_1 =100, $\overline{X}_1$ = 12.2 and S_1 = 1.1 for sample 1 and n_2 =200, $\overline{X}_2$ = 9.1 and S_2 = 0.9 for sample 2. Assume that samples are drawn from two independent normal populations.

34. The point estimate of the difference of two population means($\mu_1 - \mu_2$) is

(A) 12.2 (B) 9.1 (C) 3.1 (D) 0.2 (E) none is correct

35. The lower 90% confidence limit for the difference of two population means ($\mu_1 - \mu_2$)is:

(A) 2.973 (B) 3.084 (C) 2.948 (D) 2.904 (E) 2.8909

36. The upper 90% confidence limit for the difference of two population means ($\mu_1 - \mu_2$)is:

(A) 3.227 (B) 3.116 (C) 3.296 (D) 3.3091 (E) 3.252

⇒**<u>For answering Questions 37, 38, 39 and 40</u>** .Use the following information.

It is claimed that an automobile is driven on the average more than 20,000 kilometres per year. To test this claim at the 0.05 level of significance, a random sample of 10 automobile owners are asked to keep a record of the kilometres they travel. If the sample mean and standard deviation of automobile driven are 23,500 kilometres and 3900 kilometres respectively, assuming that the kilometres they travel is normally distributed. Then to test for $H_0 : \mu = 20,000$ kilometres against $H_1 : \mu > 20,000$ kilometres:

37. Test statistic is:

(A) $t = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ (B) $z = \dfrac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$ (C) $t = \dfrac{\bar{d}}{s_d/\sqrt{n}}$ (D) $t = \dfrac{\bar{x} - \mu}{s}$ (E) $z = \dfrac{\bar{x} - \mu}{\sigma}$

38. Critical region (rejection area) is:

(A) z> 1.645 (B) t> 1.833 (C) t<-1.833 (D) z<-1.645 (E) z>1.96

39. Computed value of test statistic is:

(A) 0.8974 (B) 2.6923 (C) 2.838 (D) 177.2295 (E) 3.233

40. Your decision is:

(A) no decision (B) accept H_0 (C) reject H_0

⇒**<u>For answering Questions 41, 42 and 43 .</u>** Consider the following

Two samples are drown from N(μ_1, σ_1^2) and N(μ_2, σ_2^2) giving the following information: First sample: $\bar{x}_1$ =21, s_1 = 11 and n_1 =36 and

Second sample: $\bar{x}_2$ =31, s_2 = 16 and n_2 = 32 .

Then to test H_o: $\mu_1 = \mu_2$ versus H_1 : $\mu_1 \neq \mu_2$ at $\alpha = 0.05$

41. The critical region (rejection area) is :

A) z> 1.645 and z<-1.645 (B) z< 1.645 (C) t<-1.833 and t> 1.833
(D) z<-1.645 (E) z<-1.96 and z>1.96

42. The Computed value of test statistic is:

(A) -2.9668 (B) 2.6923 (C) 0.8974 (D) -17.2295 (E) 4.332

43. Your decision is:

(A) accept H_0 (B) reject H_0 (C) no decision

44. A certain geneticist is interested in the proportion of males and females in the population that have a certain minor blood disorder. In a random sample of 1500 males, 75 are found to have disorder, whereas 80 of 2000 females appear to have disorder. Then the 90% confidence intervals for the difference between the proportions of males and females that have blood disorder is :

(A) (0.0112, 0.0223) (B) (-0.0167, 0.0223) (C) (-0.0017, 0.0217)
(D)(0.001, 0.0445)