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***STAT 145** Final Exam*
First Semester 1431– 1432 H

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- Mobile phones are not allowed in the classrooms.
- Time allowed is 180 minutes
- Answer all questions.
- Choose the nearest number to your answer.
- WARNING: Do not copy answers from your neighbors. They have different questions forms.
- 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
B	**C**	A	A	B	C	C 0.125	B	B	C

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

21	22	23	24	25	26	27	28	29	30
C	D	A	D	A	A	B	A	B	D

31	32	33	34	35	36	37	38	39	40
A	A	C	C	D	B	A	C	D	D

41	42	43	44	45
A	B	A	D	B

- **Let X be the number of serious cases accepted in an emergency Hospital section in one hour. The probability distribution of X is as follows:**

x	**0**	**1**	**2**	**3**
P(X=x)	**0.3**	**0.5**	**0.15**	**k**

1. The value of k is:

(A) 0	(B) 0.05	(C) 0.5	(D) 1

2. The probability that $P(X \le 1)$ is:

(A) 0.2	(B) 0. 5	(C) 0.8	(D) 2/3

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- **You are given the following Data: 9.5, 9, 8, 7, 8.5, and 10**

3. The best measure of center is:

(A) the mean	(B) the median	(C) the variance	(D) the mode

4. The mean of the data is:

(A) 8.67	(B) 8	(C) 52	(D) 6

5. The median of the data is:

(A) 8.67	(B) 8.75	(C) 7.5	(D) no median

6. The variance of the data is:

(A) 1.08	(B) 0.97	(C) 1.17	(D) 0.99

7. The coefficient of variation for the data is:

(A) 3.4	(B) 7.41	(C) 0.135	(D) 1.17

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- **The following table gives the classification of a group of 350 patients according to sex (M or F) and whether or not a person has a Coronary heart disease (C):**

Disease	M	F	**Total**
C	150	80	**230**
$\overline{C}$	50	70	**120**
Total	**200**	**150**	**350**

8. The event $\overline{C}$ and F are :

(A)Independent	(B) Dependent	(C) Disjoint	(D) Mutually Exclusive

9. The probability of either $\overline{C}$ or F is:

(A) 0.13	(B) 0.57	(C) 0.77	(D) 0.20

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➢ **The following table shows the results of a screening test evaluation in which a random sample of 800 subjects with disease and an independent sample of 1300 subjects without the disease participated:**

Test results	**Present (D)**	**Absence ($\overline{D}$)**	**Total**
Positive (T)	710	50	**760**
Negative ($\overline{T}$)	90	1250	**1340**
Total	**800**	**1300**	**2100**

10. The probability of false positive result is:

(A) 25/26	(B) 71/80	(C) 1/26	(D) 9/80

11. The sensitivity of the test is:

(A) 1/26	(B) 9/80	(C) 25/26	(D) 71/80

12. The specificity of the test is:

(A) 1/26	(B) 9/80	(C) 25/26	(D) 71/80

If the true probability of the disease is 0.1 then:

13. The predictive value negative of the test is:

(A) 0.85	(B) 0.72	(C) 0.99	(D) 0.90

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➢ **A clinic used to receive some cancer patients with mean 2.5 cases every week. Suppose that the number of cases received every week follow Poisson distribution, then**

14. The probability that the clinic will receive next week more than one cancer patient is**:**

(A) 0.287	(B) 0.205	(C) 0.795	(D) 0.713

15. The probability that the clinic will receive next month (Assume one month = 4 weeks) exactly 5 cancer patients is:

(A) 0.050	(B) 0.7356	(C) 0.094	(D) 0.038

16. The average number of cancer patients received in one month (Assume one month = 4 weeks) is:

(A) 2.5	(B) 10	(C) 5	(D) 30

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- **Suppose that a group of 10 patients visit a certain Diabetic clinic. If it is known that 25% of persons visiting the clinic are Diabetic, then:**

17. The probability that there will be, in the group, three Diabetic patients is:

(A) 0.30	(B) 0.25	(C) 0.75	(D) 0.7

18. The probability that there will be at least one Diabetic patient is:

(A) 0.944	(B) 0.056	(C) 0.1	(D) 0.9

19. The expected number of Diabetic patients in the group is:

(A) 7	(B) 5	(C) 2.5	(D)) 3

20. The Variance of the number of Diabetic patients in the group is:

(A) 1.675	(B) 2.5	(C) 4	(D) 6

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- **A random variable has a normal distribution with mean μ = 50 and standard deviation σ = 5.2. The probability that the random variable will take a value:**

21. less than 55.2 is:

(A) 0.2649	(B) 0.7538	(C) **0.8413**	(D) 0.8909

22. greater than 60.3 is:

(A) 0.1	(B) 0.5	(C) 0.4	(D) **0.02**

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- **The heights of a random sample of 50 college students showed a mean of 174.5 centimeters and a standard deviation of 6.9 centimeters**.

23. The lower bound of 98 % confidence interval for the mean height of all college students is:

(A) **172.23**	(B) 174.5	(C) 176.77	(D) 167.60

24. The upper bound of 98 % confidence interval for the mean height of all college students is:

(A) 0.5524	(B) 167.60	(C) 172.23	(D) **176.77**

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➢ **A new-rocket–launching system is being considered for development of small, short-range rockets. The existing system has P = 0.8 as the probability of a successful launch. A sample of 40 experimental launches is made with the new system out of which 34 are successful. Let *P* be the proportion of successful launches under the new system.**

25. A lower bound of 95 % confidence interval for *P*, is:

(A) **0.739**	(B) 0.800	(C) 0.761	(D) 0.250

26. An upper bound of 95 % confidence interval for *P*, is:

(A) **0.961**	(B) 0.750	(C) 0.009	(D) 0.893

27. On testing that whether the new system is better, the test statistic value is:

(A) 1.960	(B) **0.79**1	(C) 1.645	(D) O.W

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➢ **A random sample of size n_1 = 25, taken from a normal population with a standard deviation σ_1 = 5.2, has a mean $\bar{x}_1$ = 81. A second random sample of size n_2 =36, taken from a different normal population with standard deviation σ_2 =3.4, has a mean $\bar{x}_2$ = 76. On testing the hypothesis, at the 0.01 level of significance, that $\mu_1 = \mu_2$ against the alternative $\mu_1 \neq \mu_2$, consider the following questions**:

28. The probability distribution used for performing the test is:

(A) **N(0, 1)**	(B) Normal	(C) t-distributior	(D) O.W

29. The test is:

(A) one-sided to left	(B**) two-sided**	(C) one-sided to right	(D) O.W

30. The critical value (the reliability coefficient) for that test is:

(A) 1.56	(B) 2.58	(C) 1.96	(D**) 2.575**

31. The value of the test statistic is:

(A) **4.22**	(B) 2.05	(C) 2.24	(D) 22.40

32. The decision is:

(A) **reject H_0**	(B) reject H_1	(C) accept H_0 and H_1	(D) O.W

- **Assume that the mean life of a machine is 6 years with a standard deviation of 1 year. Suppose that the life of such machines follows approximately a normal distribution. If a random sample of 4 is selected from these machines, then:**

33. The probability distribution of a sample mean is called a :

(A)Standard error	(B)Random sampling	(C)**Sampling distribution**	(D) Standard deviation

34. The sample mean $\bar{x}$ has a standard deviation equals to:

(A) 0.79	(B) 0.70	(C) **0.50**	(D) 0.25

35. If $P(\overline{X} > b) = 0.1492$, then the value of b is**:**

(A) 0.85	(B) .20	(C) 1.04	(D) **6.52**

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- **Suppose that 7 % of the pieces from a production process A are defective while that proportion of defective for another production process B is 5 %. A random sample of size 400 pieces is taken from the production process A while the sample size taken from the production process B is 300 pieces. If $\hat{P}_1$ and $\hat{P}_2$ be the proportions of defective pieces in the two samples, respectively, then:**

36. The sampling distribution of $\hat{P}_1 - \hat{P}_2$ is:

(A) N(0, 1)	(B) **Normal**	(C) T	(D) unknown

37. The value of the standard error of the difference $(\hat{P}_1 - \hat{P}_2)$ is:

(A) **0.02**	(B) 0.10	(C) 0	(D) 0.22

- **A random sample of 35 students in a certain university resulted in the sample proportion of smokers $\hat{p}$ = 0.15. Then:**

38. The point estimate of p is**:**

(A) 0.35	(B) 0.85	(C) **0.15**	(D) 0.80

39. The standard deviation of $\hat{p}$ is:

(A) 0.3214	(B) .0036	(C) 0.1275	(D) **0.0604**

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- **The following are the average weekly losses of worker-hours due to accidents in 10 industrial plants before and after a certain safety program was put into operation:**

45 and 36	**73 and 60**	**46 and 44**	**124 and 119**	**33 and 35,**
57 and 51	**83 and 77**	**34 and 29**	**26 and 24**	**17 and 11**

On testing whether the safety program is effective, consider the following questions using the 0.05 level of significance: (Hint: $\bar{x}_d$ = 5.2 and s_d = 4.08)

40. The computed value of the test statistic is:

(A) 4.08	(B) 5.2	(C) 1.383	(D) **4.03**

41. The critical value of the test is:

(A) **1.833**	(B) 1.813	(C) 2.262	(D) 2.821

42. The decision is:

(A) reject H_1	(B) **reject H_0**	(C) accept H_0 and H_1	(D) O.W

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- **One production process yielded 28 defective pieces in a random sample of size 400 while another yielded 15 defective pieces in a random sample of size 300. On testing the null hypothesis $P_1 = P_2$ (that the two process yield equal proportions of defectives) against alternative hypothesis $P_1 \neq P_2$, consider the following questions using the 0.05 level of significance**:

43. The test statistic value is:

(A) **1.10**	(B) 1.96	(C) 0.061	(D) 2.58

44. The value from the table is:

(A) 1.65	(B) 2.33	(C) 2.58	(D) **1.96**

45. The decision is:

(A) accept H_1	(B) **accept H_0**	(C) reject H_0 and H_1	(D) O.W