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STAT 145 Final Exam
First Semester 1431– 1432 H

- 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	B	B	C
						0.125			

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
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2. The probability that $P(X \leq 1)$ 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
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4. The mean of the data is:

(A) 8.67	(B) 8	(C) 52	(D) 6
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5. The median of the data is:

(A) 8.67	(B) 8.75	(C) 7.5	(D) no median
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6. The variance of the data is:

(A) 1.08	(B) 0.97	(C) 1.17	(D) 0.99
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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
\bar{C}	50	70	120
Total	200	150	350

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

(A) Independent	(B) Dependent	(C) Disjoint	(D) Mutually Exclusive
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9. The probability of either \bar{C} or F is:

(A) 0.13	(B) <u>0.57</u>	(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 (\bar{D})	Total
Positive (T)	710	50	760
Negative (\bar{T})	90	1250	1340
Total	800	1300	2100

10. The probability of false positive result is:

(A) 25/26	(B) 71/80	(C) <u>1/26</u>	(D) 9/80
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11. The sensitivity of the test is:

(A) 1/26	(B) 9/80	(C) 25/26	(D) <u>71/80</u>
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12. The specificity of the test is:

(A) 1/26	(B) 9/80	(C) <u>25/26</u>	(D) 71/80
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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) <u>0.99</u>	(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) <u>0.713</u>
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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) <u>0.038</u>
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16. The average number of cancer patients received in one month (Assume one month = 4 weeks) is:

(A) 2.5	(B) <u>10</u>	(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) <u>0.25</u>	(C) 0.75	(D) 0.7
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18. The probability that there will be at least one Diabetic patient is:

(A) <u>0.944</u>	(B) 0.056	(C) 0.1	(D) 0.9
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19. The expected number of Diabetic patients in the group is:

(A) 7	(B) 5	(C) <u>2.5</u>	(D) 3
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20. The Variance of the number of Diabetic patients in the group is:

(A) <u>1.675</u>	(B) 2.5	(C) 4	(D) 6
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- A random variable has a normal distribution with mean $\mu = 50$ and standard deviation $\sigma = 5.2$. 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
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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
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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
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26. An upper bound of 95 % confidence interval for P , is:

(A) 0.961	(B) 0.750	(C) 0.009	(D) 0.893
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27. On testing that whether the new system is better, the test statistic value is:

(A) 1.960	(B) 0.791	(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 $\sigma_1 = 5.2$, 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 $\sigma_2 = 3.4$, 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-distribution	(D) O.W
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29. The test is:

(A) one-sided to left	(B) two-sided	(C) one-sided to right	(D) O.W
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30. The critical value (the reliability coefficient) for that test is:

(A) 1.56	(B) 2.58	(C) 1.96	(D) 2.575
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31. The value of the test statistic is:

(A) 4.22	(B) 2.05	(C) 2.24	(D) 22.40
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32. The decision is:

(A) reject H_0	(B) reject H_1	(C) accept H_0 and H_1	(D) O.W
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- 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
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34. The sample mean \bar{x} has a standard deviation equals to:

(A) 0.79	(B) 0.70	(C) 0.50	(D) 0.25
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35. If $P(\bar{X} > b) = 0.1492$, 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
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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
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- 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
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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
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41. The critical value of the test is:

(A) 1.833	(B) 1.813	(C) 2.262	(D) 2.821
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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
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44. The value from the table is:

(A) 1.65	(B) 2.33	(C) 2.58	(D) 1.96
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45. The decision is:

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