KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
DHAHRAN, SAUDI ARABIA

STAT 319: Probability & Statistics for Engineers & Scientists

Semester 153

Final Exam (A)

Wednesday, August 31, 2016

Time: 7:00 pm

Please circle your instructor name

Riaz Saleh Al-Momani Malik

Name: ID#: Section #: Serial #:

PLEASE WRITE YOUR CORRECT CHOICE FOR EACH QUESTION IN THIS TABLE BELOW

Q. No	Correct choice	Q. No	Correct Choice	Q. No	Correct Choice
Q1		Q11		Q21	
Q2		Q12		Q22	
Q3		Q13		Q23	
Q4		Q14		Q24	
Q5		Q15		Q25	
Q6		Q16		Q26	
Q7		Q17		Q27	
Q8		Q18		Q28	
Q9		Q19		Q29	
Q10		Q20		Q30	
Total Marks					30
Marks Obtained					

A simple linear regression model is used to express drain current *y* (in mill amperes) as a function of ground-to-source voltage *x* (in volts). The data, with some required sums, are as follows: (For Q1 to Q5)

S#	Y	X	YX	Y^2	X^2
1	0.734	1.1	0.8074	0.538756	1.21
2	1.5	1.6	2.4	2.25	2.56
3	0.886	1.2	1.0632	0.784996	1.44
4	1.66	1.7	2.822	2.7556	2.89
5	1.04	1.3	1.352	1.0816	1.69
6	1.81	1.8	3.258	3.2761	3.24
7	1.19	1.4	1.666	1.4161	1.96
8	1.97	1.9	3.743	3.8809	3.61
9	1.35	1.5	2.025	1.8225	2.25
10	2.12	2	4.24	4.4944	4
SUM	14.26	15.5	23.3766	22.30095	24.85

1. The fitted simple linear regression model to these data is:

a. $\widehat{Y}$ = 0.967 - 1.54 X

b. $\widehat{Y}$ = - 0.967 + 0.54 X

c. $\widehat{Y}$ = 0.967 + 0.54 X

d. $\widehat{Y}$ = - 0.967 + 1.54 X

e. $\widehat{Y}$ = 0.967 - 0.54 X

2. A 95% prediction interval estimate for the individual Y when x=1.4 is:

a. (1.921, 1.961)

b. (1.921, 1.201)

c. (1.187, 1.201)

d. (1.187, 1.961)

e. (1.187, 1.798)

3. The explained variation in the total variation of drain current justified by the relationship with the ground to-to-source voltage is approximately equal to

    a. 0.89

    b. 0.87

    c. 0.92

    d. 0.99

    e. 0.95

4. 4. If ground to-to-source voltage is changed by 5 volts the drain current will

    a. decrease by 7.7 ma

    b. decrease by 6.733 ma

    c. increase by 6.733 ma

    d. increase by 8.733 ma

    e. increase by 7.7 ma

5. Using the above data the Mean squared error (MSE) is

    a. 0.000008

    b. 1.966130

    c. 0.000662

    d. 1.966192

    e. 0.000238

6. In regression assume that your estimated slope is equal to – 3.2 and the standard deviation of the slope is 0.5 for a sample of size more than 100. Is there statistical evidence on a linear relationship between X and Y?

a. No evidence

b. Strong evidence

c. Some evidence

d. Can't tell

e. You need more information

7. The sample correlation coefficient between X and Y is 0.375. It has been found out that the p – value is 0.256 when testing $H_0: \rho = 0 \quad vs. \quad H_1: \rho \neq 0$.
To test $H_0: \rho \leq 0 \quad vs. \quad H_1: \rho > 0$ at significance level of 10%, the p – value is?

a. 0.128.

b. 0.256.

c. 0.872.

d. 0.375.

e. We can't find the p – value depending on the given information.

8. If the dependent variable increases as the independent variable increases in an estimating equation, the coefficient of correlation will be in the range:

a. – 1 to 0

b. – 0.05 to 0

c. – 0.05 to + 0.5

d. 0 to +1

e. None of the above.

9. In developing an interval estimate for a population mean, the population standard deviation was assumed 10. The interval estimate was 59.92 ± 2.14. If the population standard deviation had been 20, what would the interval estimate be?

    a. 60.92 ± 2.14

    b. 59.92 ± 12.14

    c. 59.92 ± 4.28

    d. 101.84 ± 4.28

    e. 101.94 ± 12.14

10. To estimate the mean of a normal population whose standard deviation is 6, with a bound on the error of estimation equal to 1.2 and confidence level of 99% requires a closest possible sample size of :

    a. 160

    b. 167

    c. 176

    d. 115

    e. 143

11. A random sample of size 200 voters is selected and 114 are found to support, an annexation suit. The 96% confidence interval for the proportion of the voting population favoring the suit given by

    a. (0.202, 0.254)

    b. (0.197, 0.259)

    c. (0.498, 0.642)

    d. (0.185, 0.247)

    e. None of the above

12. Ten engineering school in the United States were surveyed. The sample contained 150 electrical engineers, 90 being men; 200 chemical engineers, 80 being men. The 90% confidence interval for the difference between the proportion of men in these two fields of engineering is given by

a. $(-0.2926, 0.1074)$

b. $(-0.1498, 0.1498)$

c. $(0.102, 0.1948)$

d. $(-0.0102, 0.1498)$

e. $(0.1074, 0.2926)$

13. The owner of a local nightclub has recently surveyed a random sample of n = 300 customers of the club. He would now like to determine whether the mean age of his customers is over 35. Suppose he found that, the sample mean was 35.5 years and the population standard deviation was 5 years. What is the p-value associated with the test statistic?

    a. 0.9582
    b. 1.73
    c. 0.05
    d. 0.083
    e. 0.0418

14. The owner of Bun & Run Hamburgers wishes to compare the sales per day at two different locations. The mean number of hamburgers sold for 10 randomly selected days at Northside was 83.55 with a standard deviation of 12.45. For a randomly selected 12 days at Southside, the mean number of hamburgers sold was 73.80 with a standard deviation of 14.25. We wish to test whether there is a difference in the mean number of hamburgers sold at the two locations using a 5% significance level. What is the correct conclusion for this hypothesis test?

    a. The test statistic lies in the rejection region and thus we reject the null hypothesis and conclude that there is a difference in sales between the two locations

    b. The test statistic lies in the rejection region thus we cannot reject the null hypothesis and conclude that there is no difference in sales between the two locations

    c. The test statistic does not lie in the rejection region and thus we reject the null hypothesis and conclude that there is a difference in sales between the two locations

    d. The test statistic does not lie in the rejection region and thus we cannot reject the null hypothesis and conclude that there is no difference in sales between the two locations

    e. None of the above choices.

15. A result is called " statistically significant" whenever

    a. The p – value is less than or equal to the significant level

    b. The null hypothesis is true

    c. The alternative hypothesis is false

    d. The p – value is larger than the significant level.

    e. There is no meaning for statistically significant.

16. Suppose you wish to test $H_0: \mu \leq 47 \ \ vs. \ H_1: \mu > 47$. What will the result be if we conclude that the mean is greater than 47 when the true value is really 52?

    a. We have made a Type I error.

    b. We have made a correct decision.

    c. We have made a Type II error.

    d. You can't tell depending on the information given.

    e. None of the above true.

17. When testing $H_0: \mu_1 - \mu_2 = 0 \ \ vs. \ H_1: \mu_1 - \mu_2 \neq 0$, the calculated value of Z was – 2.13. The p – value for the test would be

    a. 0.0166

    b. 0.9668

    c. 0.0332

    d. 0.9834

    e. None of the above

18. The engineer measures weight of 25 pieces of steel, he obtains an average of 6 and variance 16. The weight follows normal distribution. He wants to test that the population mean is more than 5, the p-value of the test is approximately equal to

a. 0.8944

b. 0.2112

c. 0.15

d. 0.11

e. 0.90

19. The following statistics were collected on two groups of cattle

	Group A	Group B
size	25	20
mean	950 lbs	1000 lbs.
standard deviation	80 lbs.	78 lbs.

(Note: Assume equal population variances)
In order to test the hypothesis that average weight of group A is lower than of group B, the test statistic value is

a. -2.606

b. 2.580

c. -1.989

d. 1.989

e. -2.106

20. A random sample of size 49 is taken from a population having a mean 75 and a standard deviation of 14. The probability that the sample mean computed from 49 measurements will be less than 70 or more than 80 is

a. 0.0124

b. 0.9332

c. 0.0062

d. 0.9932

e. 0.9876

21. Assume that X is continuous random variable with density function $f(x) = 4x^3,\ 0 < x < 1$, the expected value of the random variable equal to

a. 0.20

b. 0.16

c. 0.8

d. 0.84

e. 0.60

22. Suppose that the amount of time one spends in a bank is exponentially distributed with mean 20 minutes. The probability that a customer will spend more than half an hour in the bank is

a. 0.7769

b. 0.2013

c. 0.7987

d. 0.2231

e. 0.1813

23. The weekly amount spent for maintenance and repairs in a certain company has approximately a normal distribution with a mean of \$400 and a standard deviation of \$20. Find 80^{th} percentile of the weekly spent amount.

a. 407.7

b. 416.8

c. 406.8

d. 417.9

e. 383.2

24. In a NiCad battery, a fully charged cell is composed to Nickelic Hydroxide. Nickel is an element that has a multiple oxidation states. Let X be the nickel charge, which has the following mass function

X	0	1	2	3
$P(X = x)$	0.18	k	0.33	0.15

Determine the value of k and the variance of the nickel change

a. $k = 0.34, \sigma^2 = 2$

b. $k = 0.34, \sigma^2 = 0.9075$

c. $k = 0.34, \sigma^2 = 1.45$

d. $k = 1.45, \sigma^2 = 3.01$

e. None of the above true.

25. In the inspection of tin plate produced by a continuous electrolytic process, one imperfection is spotted per minute, on average. The probability that at most two imperfections in 5 minutes equal to

a. $\frac{37}{2}e^{-5}$

b. $\frac{25}{2}e^{-1}$

c. $6e^{-5}$

d. $\frac{25}{2}e^{-5}$

e. None of the above true

26. The probability that your call to a service line is answered in less than 30 seconds is 0.75. assume that your calls are independent, if you call 10 times, then the probability that exactly 9 of your calls are answered within 30 seconds equal

a. 0.8122

b. 0.1877

c. 2.861×10^{-5}

d. 0.9999

e. 0

27. Let A and B be independent events with P (A) = 1/4 and P (A ∪ B) = 2P (B) – P (A).

What is P (B)?

a. 2/5

b. 2/3

c. 4/5

d. 3/4

e. ½

28. The following g data represent the score of 16 students in STAT-319 exam out of 100:

60	55	90	86	50	60	75	100
55	100	50	50	20	50	75	80

If $\overline{X}$, M and MO are respectively the mean, median and mode, then the ratio $\frac{\bar{X}+2.M}{3.MO}$ equals to

a. 1.00
b. 0.92
c. 1.32
d. 0.84
e. 1.24

29. There are three students in a room, ages 18, 19 and 20. If a 20 – years – old student enter the room, then the

a. mean age will stay the same but the standard deviation will decrease
b. mean age will stay the same but the standard deviation will increase
c. mean age and the standard deviation will increase
d. mean age will increase but the standard deviation will decrease
e. mean age and the standard deviation will stay the same

30. A set of data is found to have a sample standard deviation of 25. Suppose 9 were added to each of the numbers in the data. The standard deviation of the resulting data

a. Would be 34
b. Would be 28
c. Would be 25
d. Cannot be determine
e. Would be 22