

Composed & Solved By
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FINAL TERM EXAMINATION
Fall 2008

MTH302- Business Mathematics & Statistics (Session - 1)

Question No: 1 (Marks: 1) - Please choose one

The c2 distribution is -----

- ▶ Positively skewed
- ▶ **Negatively skewed**
- ▶ Symmetrical
- ▶ None of these

Question No: 2 (Marks: 1) - Please choose one

In the regression line $Y = a + bX$, a represents

- ▶ **Intercept of the line**
- ▶ Slope of the line
- ▶ Slope of the curve
- ▶ None of the above

Question No: 3 (Marks: 1) - Please choose one

In the formula, $POISSON = \frac{e^{-\lambda} \lambda^x}{x!}$, e is a constant whose value is

- ▶ **2.71828**
- ▶ 3.14157
- ▶ 22 / 7
- ▶ 9.325

Question No: 4 (Marks: 1) - Please choose one

Which distribution is most commonly used for the continuous data?

- ▶ **Normal Distribution**
- ▶ Binomial Distribution
- ▶ Poisson Distribution
- ▶ Negative Binomial Distribution

Question No: 5 (Marks: 1) - Please choose one

For any event if the probability of success is x, then the probability of failure is

- ▶ also x
- ▶ 1 + x
- ▶ **1 - x**

Note: Solve these papers by yourself
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▶ x - 1

Question No: 6 (Marks: 1) - Please choose one

The standard deviation of any sampling distribution is called

- ▶ sampling error
- ▶ type -I error
- ▶ **standard error**
- ▶ non sampling error

Question No: 7 (Marks: 1) - Please choose one

For graphing univariate data we use

- ▶ Pie charts, Bar charts .
- ▶ Pareto diagrams.
- ▶ Side by side chart .
- ▶ **Both (1) & (2)**

Question No: 8 (Marks: 1) - Please choose one

Interest paid (earned) on only the original principal borrowed (lent) is often referred to as

- ▶ **simple interest**
- ▶ present value
- ▶ future value
- ▶ compound interest

Question No: 9 (Marks: 1) - Please choose one

The sales of a company increases from Rs.100,000 last month to Rs.120,000 this month.
The percentage change in profit for the month?

- ▶ **20%**
- ▶ 40%
- ▶ 10%
- ▶ 60%

Question No: 10 (Marks: 1) - Please choose one

Amount of discount is obtained as

- ▶ Percentage of Discount x List Price
- ▶ Percentage of Discount / List Price
- ▶ Percentage of Discount - List Price
- ▶ **None of these**

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Question No: 11 (Marks: 1) - Please choose one

If a and b are any two integers such that $a < b$ then $a - b$ is

- ▶ positive
- ▶ **negative**
- ▶ cannot be told
- ▶ zero

Question No: 12 (Marks: 1) - Please choose one

If the salary of an employee is 10,000 and his allowances are 5,000 then what is the taxable income of the employee?

- ▶ 5,000
- ▶ **10,000**
- ▶ Zero
- ▶ 15,000

Question No: 13 (Marks: 1) - Please choose one

Compound interest is always:

- ▶ **Higher than simple interest**
 - ▶ Smaller than simple interest
 - ▶ Less than annuity
- ▶ Equals to simple interest

Question No: 14 (Marks: 1) - Please choose one

The RSQ of any data is

- ▶ Square root of correlation coefficient.
- ▶ **Square of correlation coefficient.**
- ▶ Correlation coefficient.
- ▶ Slope of the data.

Question No: 15 (Marks: 1) - Please choose one

12% of the electric bulbs manufactured by a company are defective. What is the probability that a bulb selected will not be defective?

- ▶ 90 %
- ▶ **88 %**
- ▶ 80 %
- ▶ 85 %

Question No: 16 (Marks: 1) - Please choose one

If there is an indirect relationship between rainfall & yield of crops then

- ▶ **Yield is higher if rainfall is less**

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- ▶ Yield is lower if rainfall is less
- ▶ Yield is higher if rainfall is higher
- ▶ Yield is higher if rainfall is nothing

Question No: 17 (Marks: 1) - Please choose one

If the estimating equation is $Y = a - b X$, which of the following is true

- ▶ The y intercept is b

- ▶ Slope of line is positive
- ▶ **There is inverse relationship**
- ▶ There is direct relationship

Question No: 18 (Marks: 1) - Please choose one

How many ways can 4 prizes be given away to 3 boys, if each boy is eligible for all the prizes?

- ▶ 256
- ▶ 12
- ▶ 81
- ▶ **None of these**

Question No: 19 (Marks: 1) - Please choose one

How many ways can 10 letters be posted in 5 post boxes, if each of the post boxes can take more than 10 letters?

- ▶ 5^{10}
- ▶ 10^5
- ▶ $10P5$
- ▶ **$10C5$**

Question No: 20 (Marks: 1) - Please choose one

Equation of line having slope 0 and passing through the point A (0, 0) is

- ▶ **$X = 0$**
- ▶ $Y = X$

- ▶ $Y = 0$
- ▶ $X - 1 = 0$

Question No: 21 (Marks: 2)

Define the Null Hypothesis.

ANS: Null hypothesis is a scenario which explain a given set of data. It is tested to determine whether data provides sufficient reasons to pursue some alternative hypothesis. It is a hypothesis that states there is no difference between 2 or more sets of data.

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Question No: 22 (Marks: 2)

A coin can be tossed in 3 ways. A die can be thrown in 6 ways. A coin and a die together can be thrown in ...**3 X 6 = 18**.....ways.

Question No: 23 (Marks: 2)

Find harmonic mean (HM) of 10,12,14,17.

ANS: Harmonic mean, $HM = n / (1/x_1 + 1/x_2 + 1/x_3 + 1/x_4 + \dots + 1/x_n)$

$$N = 4$$

$$X_1 = 10$$

$$X_2 = 12$$

$$X_3 = 14$$

$$X_4 = 17$$

$$1/x_1 + 1/x_2 + 1/x_3 + 1/x_4 = 1/10 + 1/12 + 1/14 + 1/17 = 0.2385$$

$$\text{Harmonic mean} = 4/0.2385 = 16.77$$

Question No: 24 (Marks: 3)

Find proportion of bags which have weight in excess of 505 g.

$$\text{Mean} = 500.$$

$$\text{StDev} = 2.5 \text{ g}$$

(For $z=2.00$ probability is 0.4772)

Question No: 25 (Marks: 3)

Given for a frequency distribution mode = 18, mean = 21. Calculate median . Using these values comment on skewness of distribution.

ANS: We know that,

$$\text{Mean} - \text{mode} = 3(\text{mean} - \text{median})$$

$$\text{Median} = (2 * \text{mean} + \text{mode}) / 3$$

Since,

$$\text{Mean} = 21$$

$$\text{Mode} = 18$$

So,

$$\text{Median} = (2 * 21 + 18) / 3$$

$$= (42 + 18) / 3 = 60 / 3 = 10$$

The distribution is Moderately skewed and unimodal distribution.

Question No: 26 (Marks: 3)

How many different ways can you select 2 letters from the set of letters: X, Y, and Z?

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(Hint: In this problem, order is NOT important; i.e., XY is considered the same selection as YX.)

ANS: Total number of letters = 3

Letters taken at a time = 2

Number of ways in which 2 letters can be selected out of 3 = ${}^3C_2 = 3! / 2!(3-2)!$

$$= 3 * 2 * 1 / 2$$

$$= 3$$

Question No: 27 (Marks: 5)

How many possible permutations can be formed from the word MATHEMATICS?

ANS: Total number of alphabets in mathematics = 11

M = 2

A = 2

T = 2

H = 1

E = 1

I = 1

C = 1

S = 1

Permutations = $11! / 2! * 2! * 2! * 1! * 1! * 1! * 1! * 1!$

$$= 11! / 8 = 4,989,600$$

Question No: 28 (Marks: 5)

Find the standard deviation of 4, 9, 11, 12, 17, 5, 8, 12, 14

ANS: Standard deviation for sample = $\sqrt{\text{sum}(X - \bar{X})^2 / n - 1}$

\bar{X} = mean = $(4+9+11+12+17+5+8+12+14)/9 = 92/9 = 10.22$

n = 9

so, n-1 = 9-1 = 8

X	$X - \bar{X}$	$(X - \bar{X})^2$
4	-6.22	38.69
9	-1.22	1.49
11	0.78	0.61
12	1.78	3.17
17	6.78	45.97
5	-5.22	27.25
8	-2.22	4.93
12	1.78	3.17

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14	3.78	14.29
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$$\Sigma(X - \bar{X})^2 = 139.57$$

$$\text{Standard deviation} = \sqrt{\frac{139.57}{8}} = 4.18$$

Question No: 29 (Marks: 5)

$$\mu = 30, \sigma = 5$$

In a normal distribution what proportion of cases will fall between 20 and 35?

Question No: 30 (Marks: 10)

Form a regression line from the data below.

Departments	X	Y
1	26	81
2	42	95
3	16	53
4	55	43
5	92	18
6	28	63
7	13	60

ANS: Slope ,b = $[n \cdot \sum(X \cdot Y) - \sum X \cdot \sum Y] / [n \cdot \sum X^2 - (\sum X)^2]$
intercept, a = $(\sum Y - b \cdot \sum X) / n$
n= 7

Departments	X	Y	X ²	X*Y
1	26	81	676	2106
2	42	95	1764	3990
3	16	53	256	848
4	55	43	3025	2365
5	92	18	8464	1656
6	28	63	784	1764
7	13	60	169	780

$$\sum X = 272$$

$$\sum Y = 413$$

$$\sum X^2 = 15138$$

$$\sum X \cdot Y = 13509$$

$$\text{slope, } b = [7(13509) - 272 \cdot 413] / [7(15138) - (272)^2]$$

$$= -17,773 / 31,982 = -0.55$$

$$\text{intercept, } a = [413 - (-0.55)272] / 7 = 80.37$$

equation of regression line is given by,

$$Y = a + bx$$

$$Y = 80.37 - 0.55x$$

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Question No: 31 (Marks: 10)

The following data gives the height (in inches) of eleven 9-years old boys in a primary school.

57, 52, 51, 49, 55, 54, 50, 48, 53, 56, 47

- a) Find first, second and third quartiles.
- b) Find interquartile range, Quartile deviation.

ANS:a) Data in arranged order: 47,48,49,50,51,52,53,54,55,56,57

number of data points, $n = 11$

position of $Q_i = i(n+1)/4$

Position of $Q_1 = (n+1)/4 = (11+1)/4 = 12/4 = 3$

So, $Q_1 = 3^{\text{rd}}$ value

= 49

Position of $Q_2 = 2(11+1)/4 = 24/4 = 6$

So, $Q_2 = 6^{\text{th}}$ value

= 52

Position of $Q_3 = 3(11+1)/4 = 36/4 = 9$

So, $Q_3 = 9^{\text{th}}$ value

55

b) Interquartile range = $Q_3 - Q_1$

= $55 - 49 = 6$

Quartile deviation = $(Q_3 - Q_1)/2$

= $(55 - 49)/2$

= $6/2 = 3$

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