

Lecture:2

Q#1: Marks =3

(a) Convert 17.5% in the fraction.

(b) Convert 40 / 240 in percent.

(c) $x\%$ of 200 = ?

Solution: (a) 0.175 (b) 16.66% (c) $2x$

Q#2: Marks =2

What percent of 30 is 9?

Solution: 30

Q#3: Marks =2

Write an Excel syntax to subtract the sum of 96, 34, 90 from the sum of 53, 45.

Lecture:3

Q#1: Marks =2

If the Basic Salary of an employee is Rs. 20,000 and Allowances are Rs. 6105, what percentage of the Basic Salary are the Allowances?

Solution: 30.52%

Q#2: Marks =3

Find Base when
Percentage = 55, Rate = 0.35

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Solution: 157.14

Q#3: Marks =5

The Salary of an employee is as follows:

Basic Salary = 20,000 Rs.

Allowances = 8,000 Rs.

What is the cost of the company on account of leaves (18.2%), group insurance/medical (5%) and other Social benefits (5.8%)?

Solution:

Gross Salary = Rs. 28000

Leaves Cost = Rs. 5096

Group Insurance/Medical = Rs. 1400

Other Social Benefits = Rs. 1624

Total Social Charges = Rs. 8120

Lecture:4

Q#1: marks=2

If the Basic salary of an employee is Rs. 22000. What is the total saving per month of the employee on account of Provident Trust Fund?

Solution:

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Total savings of employee in Provident Fund = 4000 Rs.

Q#2: marks=3

The mean of the numbers 16,10, 8 and x is 12; find the value of x.

Solution: $x=14$

Q#3: marks=5

Sam wants to buy a new camera, and decides on the following rating system:

- Image Quality 50%
- Battery Life 30%
- Zoom Range 20%

The Cony camera gets 8 (out of 10) for Image Quality, 6 for Battery Life and 7 for Zoom Range

The Sanon camera gets 9 for Image Quality, 4 for Battery Life and 6 for Zoom Range

Which camera is best?

Solution:

Weighted mean for Cony: = 7.2

Weighted mean for Sanon: = 6.9

Sam decides to buy the Cony.

Lecture:5

Q#1: Marks=3

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A pair of glasses went from \$5 to \$6, what is the percentage change?

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Solution: 20% rise.

Q#2: marks= 3

The price of a water heater was \$150 and is increased by 15 %. Calculate the New Price?

Solution: \$172.5

Q#3: marks= 5

If the Series Discounts offered by wholesaler are 15 %, 10 % and 17.5% on an item that costs \$1250. Find the Initial Price and Single Discount Rate.

Solution:

Cost Price = 1250

New price = 788

Series Discount= 63.11%

Single Discount Rate = $100 - 63.11$
= 36.89 %

Therefore

Initial Price = \$788 and Single Discount Rate = 36.89 %

Lecture:6

Q#1: marks= 2

Find the Discount when price is 3000 and discount rate is 12.5%.

Solution: Discount = 375

Q#2: Marks= 5

If you invested Rs.80,000 at the rate of 11% per annum for 8 years. Calculate simple as well as compound interest of the amount.

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Solution:

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For simple interest, we use

$$I = (P \cdot R \cdot T) / 100,$$

Where I= simple interest

P= principal

R= rate of interest percent per annum

T= time in years

Here

$$I = (80,000 \cdot 11 \cdot 8) / 100 = \text{Rs. } 70400$$

For compound interest, we use

$$S = P(1 + r/100)^n,$$

Where S= compound interest

P= principal

r= rate of interest

n= time in years

Here

$$S = 80,000(1 + 11/100)^8 = \text{Rs. } 184363.02$$

Lecture:7

Q#1: Marks= 3

If interest rate is 11% compounded quarterly and the number of payments are 24, then calculate the Accumulation Factor.

Solution:

Accumulation Factor. = 33.36822199

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Q#2: Marks= 5

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If you deposit Rs.20,000 at the end of each month into an account with earning rate 5%, how much will you have after 10 years?

Solution:

Amount of annuity = $C = 20,000$

Rate of interest = $i = 0.05/12 = 0.0042$

Number of periods = $n = 10 \times 12 = 120$

So, Future value is

$$\begin{aligned} &= C \left[\frac{(1+i)^n - 1}{i} \right] \\ &= 20,000 \left[\frac{(1+0.0042)^{120} - 1}{0.0042} \right] \\ &= \text{Rs.}31122300.83 \end{aligned}$$

Lecture:8

Q#1: Marks= 2

What does this function do?

=CUMIPMT (0.09/12, 9*12, 30000, 1, 9, 0)

Solution:

It returns the cumulative interest paid on a loan for first nine months where the interest rate is 9% and year of loan is 12 and loan is 30000.

Q#2: Marks= 3

Suppose that you establish an IRA (Individual Retirement Account) at age 50 and you will retire after 15years hence at age 65. You plan to make annual payments of Rs1200 into the IRA at the beginning of each year. If you assume a rate of return of 9.5 percent a year, calculate the future value of your IRA when you will retire at age 65.

Solution:

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=FV(9.5%,15,-1200,0,1)

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Writing this formula is all enough as you are not using excel but just applying formula for the required purpose.

Q#3: Marks= 5

What tasks do the following Excel functions perform?

- (i) **CUMPRINC**
- (ii) **IPMT**
- (iii) **PPMT**
- (iv) **NPER**
- (v) **CUMIPMT**

Solution:

CUMPRINC returns the cumulative principal paid on a loan between two periods.

IPMT returns the interest payment for an investment for a given period.

PPMT returns the payment on the principal for an investment for a given period

NPER returns the number of periods for an investment

CUMIPMT returns the cumulative interest paid on a loan between two periods

Lecture No. 9

Q#1: Marks =3

A college library has 500 English novels, 600 Urdu Novels, 400 Urdu short stories and 350 English short stories. Write this data in matrix form.

Solution:

Short Stories

Novel

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Urdu

Engl

ish

[600 500]
[400 350] []

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Q#2: Marks =3

Write a row matrix and column matrix. Also write a square matrix of order 5.

Solution:

$[1 \ 2 \ 3]$ row matrix

$\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ column matrix

$\begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 6 & 7 & 8 & 9 & 10 \\ 1 & 2 & 3 & 4 & 5 \\ 6 & 7 & 8 & 9 & 10 \\ 1 & 2 & 3 & 4 & 5 \end{bmatrix}$ matrix of order 5

Q#3: Marks =5

$$A = \begin{bmatrix} 4 & 3 \\ 3 & \end{bmatrix}$$

Find the Multiplicative Inverse of A and show that $A^{-1}A = I$
Where I is the Identity Matrix.

Solution:

So multiplicative inverse is

$$A^{-1} = \begin{bmatrix} -2 & 3 \\ 3 & -4 \end{bmatrix}$$

and

$$A^{-1}A = \begin{bmatrix} -2 & 3 \\ 3 & -4 \end{bmatrix} \begin{bmatrix} 4 & 3 \\ 3 & \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

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$$\begin{bmatrix} 3 & -4 & 3 & 2 & 0 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$

Please do different steps to reach to the above results yourself.

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Lecture No. 10

Q#1: Marks =3

Multiply:

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 5 & 7 \\ 1 & 5 \end{bmatrix}$$

Solution:

$$\begin{bmatrix} 1+10+3 & 3+14+15 \\ 4+25+6 & 12+35+30 \end{bmatrix} \\ = \begin{bmatrix} 14 & 32 \\ 35 & 77 \end{bmatrix}$$

Q#2: Marks =5

If possible, find AB and BC when

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}, \quad B = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \quad C = \begin{bmatrix} 3 & 5 & 3 \end{bmatrix}$$

Solution:

$$AB = \begin{bmatrix} 1+4+9 \\ 4+10+18 \end{bmatrix} = \begin{bmatrix} 14 \\ 32 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 5 & 3 \end{bmatrix}$$

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$$BC = \begin{bmatrix} 6 & 10 & 6 \\ 9 & 15 & 9 \end{bmatrix}$$

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Lecture No. 11

Q#1: marks=3

Can the determinant of a Square matrix be calculated? Find the determinant of

$$A = \begin{bmatrix} 3 & 5 \\ 2 & \quad \end{bmatrix}, \text{ if possible.}$$

Solution:

Yes, we can only find the determinant of a square matrix (NO. of columns= NO. of rows).

$$A = \begin{bmatrix} 3 & 5 \\ 2 & \quad \end{bmatrix}$$

$$\det A = \begin{vmatrix} 3 & 5 \\ 2 & 8 \end{vmatrix}$$

$$= 3 \times 8 - 5 \times 2$$

$$= 24 - 10$$

$$= 14$$

Q#2: marks=5

Does $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ satisfy the equation

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$$2A^2 - 5A = \begin{bmatrix} 8 & 25 \\ 5 & 13 \end{bmatrix}$$

Explain why A does or does not satisfy the equation.

Solution:

Yes.

$$A^2 = \begin{bmatrix} 9 & 25 \\ 5 & 14 \end{bmatrix}$$

Now,

$$\begin{aligned} 2A^2 - 5A &= 2 \begin{bmatrix} 9 & 25 \\ 5 & 14 \end{bmatrix} - 5 \begin{bmatrix} 2 & 5 \\ & \end{bmatrix} \\ 2A^2 - 5A &= \begin{bmatrix} 18 & 50 \\ 10 & 28 \end{bmatrix} - \begin{bmatrix} 10 & 25 \\ & \end{bmatrix} \quad \text{\\} \\ 2A^2 - 5A &= \begin{bmatrix} 8 & 25 \\ 5 & 13 \end{bmatrix} \end{aligned}$$

Lecture No. 12

Q#1: Marks=3

Find the unknown $5 : (y+2) = 20 : 80$

Solution:

$$5 : (y+2) = 20 : 80$$

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$$5/(y+2) = 20/80,$$

$$5/(y+2) = 1/4,$$

$$5 \times 4 = (y+2)1,$$

$$20 = y+2,$$

$$y=18.$$

Q#2: marks= 5

Two drinks are mixed in ratio 2:8. Calculate the quantity of each type of drink in 100 liter of drink.

Solution:

Ratio = 2: 8

Sum of ratios = 2+8 = 10

Total weight of mixture = 100 liter

Quantity of first type of drink = $2/10 \times 100 = 20$ liter

Quantity of second type of drink = $8/10 \times 100 = 80$ liter

Lecture No. 13

Q#1: marks= 3

A tv is sold on Rs. 10,000 at a gain of 20%. Find the amount of profit.

Solution:

As Profit = Selling price – Cost

Let X be the cost of chain then

$X + 20\% \text{ of } X = 10,000$

$1.2 X = 10000$

$X = 10000/1.2 = 8333.33$

Profit = $10000 - 8333.33 = \text{Rs. } 1666.67$

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Q#2: Marks= 5

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A juicer is marked up by 10% to \$ 500. What is the cost price and mark up price?

An article is Marked up by 9% to \$ 654. What is the cost price and Markup price?

Solution:

Let 'X' be the cost price of an article.

Markup = 0.10 X

According to given condition

$X + 0.1X = 500$

$1.1 X = 500$

$X = 500/1.1$

$X = \$ 454.55$

Mark up price = $500 - 454.55 = \$45.45$

Cost price = $x = \$ 454.55$

Lecture No. 14

Q#1: Marks= 3

Find the single discount rate that is equivalent to the series discounts 15%, 10%, 8%.

Solution:

Apply the multiple discounts to a list price of Rs. 100

$$\begin{aligned}\text{Net price} &= 100(1-d_1)(1-d_2)(1-d_3) \\ &= 100 (1 - 0.15) (1 - 0.1) (1 - 0.08) \\ &= 100 (0.85) (0.9)(0.92) \\ &= 70.38\%\end{aligned}$$

$$\% \text{ Discount} = (100 - 70.38) \% = 29.62\%$$

Q#2: Marks= 5

The price of a truck is Rs. 600,000. The series discounts are 30%, 5%, 15%. What is the net price?

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Solution:

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$$\text{Net price} = L (1-d_1) (1-d_2) (1-d_3)$$

$$\begin{aligned}\text{Net price} &= 600,000(1-0.3)(1-0.05)(1-0.15) \\ &= 600,000(0.7)(0.95)(0.85) \\ &= 600,000(0.56525) \\ &= \text{Rs. } 339,150\end{aligned}$$

Lecture No. 15

Q#1: Marks=3

An item that regularly sells for \$ 550 is Marked down to \$ 385. What is the Discount Rate?

Solution:

$$\begin{aligned}\text{Mark down} &= 550 - 385 = \$ 165 \\ \text{Mark down Rate} &= (165 / 550) \times 100 \\ \text{Mark down Rate} &= 30 \%\end{aligned}$$

Q#2: Marks=5

Ahsan's greeting card business sells a card for Rs. 90. If each card costs Rs 70 to him, what is the Markup on Selling Price? Convert the Markup on Sale to %age Markup on Cost.

Solution:

$$\begin{aligned}\text{Selling price} &= \text{Rs. } 90 \\ \text{Cost price} &= \text{Rs. } 70 \\ \text{Markup on selling price} &= \frac{\text{Selling price} - \text{Cost price}}{\text{Selling price}} \times 100\% \\ &= \frac{90 - 70}{90} \times 100\% \\ &= 22.22 \%\end{aligned}$$

$$\begin{aligned}\% \text{ Markup on Cost} &= \% \text{ Markup on Sale} / (1 - \% \text{ Markup on Sale}) \\ &= 22.22\% / (1 - 22.22\%) \\ &= 0.2222 / (0.7778) \\ &= 0.2857\end{aligned}$$

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= 28.57%

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Practice questions for lecture#16-22 of MTH302

1. Find the original price of an ink pen with 10% mark down rate and have selling price of Rs.200.
Answer=222.22
2. A calculator originally sold for Rs.925 and was marked down to sell for Rs.800. Find the rate of mark down.
Answer=13.5%
3. The markup rate of an item is 20% of cost. Find the selling price of that item with cost price Rs.63.
Answer=75.6
4. Use AMORDEGRC and AMORLINC functions to calculate the depreciation of an asset during the 1st period. The asset was purchased on 01-Jan-2011, at a cost of \$150 and the 1st period ends on 30-Sep-2011. The assets depreciation rate is 20% per year and has a salvage value of \$20.
Answer=42, 30.
5. Calculate the internal rate of return after 3 years and 5 years for the following data:
Initial investment= -\$100
Year 1 income=20
Year 2 income=24
Year 3 income=28.80
Year 4 income=34.56
Year 5 income=41.47
Answer= -14%, 13%.
6. Find NPV if return from 1st, 2nd and 3rd years is 1000, 1500 and 2000 respectively with initial cost from today is 10,000; annual discount rate is 25%.
Answer=5772.80.
7. Find the PV of an annuity with an interest rate of 8% per year and payments of 1000 per month over 10 years.
Answer=82421.48.
8. Solve the following system of linear equations
$$4x-9y=12$$

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$$2x+y=2$$

Answer($x=15/11$, $y=-8/11$)

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9. If the cost of an asset is \$10,000 and after 7 years its salvage value is \$2500 then find the sum of years digits depreciation of an asset for one year.

Answer=1875.

10. A product can be sold for Rs.95 per unit. Cost analysis provides the following information:

fixed cost per period=FC= Rs. 8500

variable cost=VC= Rs. 30 per unit

Find the contribution margin and contribution rate.

Answer=contribution margin=65 and contribution rate=68.42%

11. Cost analysis provides the following information:

fixed cost per period=FC= Rs. 10,000

variable cost=VC= Rs. 15 per unit

selling price per unit=S=Rs. 25.

Calculate breakeven point in Rupees.

Answer=25000

12. Cost analysis provides the following information:

fixed cost per period=FC= Rs. 3500

variable cost=VC= Rs. 155 per unit

selling price per unit=S=Rs. 200

production capacity=350 units.

Determine the breakeven point as a % of capacity if FC is reduced to RS.2600.

Answer=16.51%.

13. Cost analysis provides the following information:

fixed cost per period=FC= Rs. 4200

variable cost=VC= Rs. 167 per unit

selling price per unit=S=Rs. 195

production capacity=450 units per period.

Determine the breakeven point as a % of capacity if S is reduced to Rs.175.

Answer=116.67%.

14. Calculate the net income (NI) of a person, if he sold 250 units. Also

fixed cost per period=FC= Rs. 2844

variable cost=VC= Rs. 67 per unit

selling price per unit=S=Rs. 95

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production capacity=320 units per period.

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Answer=4156.04

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