

MTH302

Business Mathematics & Statistics

Formula Sheet

2 Chapters, 721 Formulas

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$$12 + 5$$

$$12 + 5 = 17$$

$$12 - 5$$

$$12 - 5 = 7$$

$$(4)^2$$

$$(4)^2 = 16$$

$$(4)^{1/2}$$

$$(4)^{1/2} = 2$$

Addition. Symbol: +

(Example: $=5+4$ Result: 9)

Subtraction. Symbol: -

(Example: $=5-4$ Result: 1)

Multiplication. Symbol: * (Example:

Multiplication. Symbol: * (Example: $=5*4$ Result: 20)

(Example:

(Example: $=12/4$ Result: 3)

(Example:

(Example: $=5^2$ Result: 25)

The formula was written in cell G34. The formula was:

$$=5+10+15+20+30+40$$

Is any add back to the income of the company?

$$\% \text{ Allowances} = (5000/10000) \times 100 = 50\%$$

Is any add back to the income of the company?

$$\% \text{ Allowances} = (7000/10000) \times 100 = 70\%$$

Utilities allowance = $0.025 \times 10000 = 250$ Rs.

Thus total allowances are $4500+250+250 = 5000$ Rs

percent of gross salary?

$$\text{Gross salary} = 10000 + 5000 = 15,000 \text{ Rs.}$$

Group insurance/medical

$$\text{Group insurance/medical} = 0.05 \times 15000 = 750 \text{ Rs.}$$

20% or 20/100

$$20\% \text{ or } 20/100 = 0.2$$

Base = 120

$$\text{Percentage} = 20/100 \times 120$$

Percentage = 96

$$\text{Base} = 96/0.24 = 400$$

There are 5 data values

$$\text{Average} = 55/5 = 11$$

1. Add numbers in a cell

$$\text{Type} = 5 + 10 \text{ in a cell}$$

corresponding weights of the data then

$$\text{Weighted average} = (x_1)(w_1) + (x_2)(w_2) + (x_3)(w_3) + \dots + (x_n)(w_n)$$

Ahmad's overall grade

$$\text{Ahmad's overall grade} = (0.10)(92) + (0.20)(68) + (0.70)(81)$$

to fraction. Total labor hours

$$\text{to fraction. Total labor hours} = 6 + 3 + 1 = 10$$

Skilled

$$6/10 = 0.6$$

Semiskilled

$$3/10 = 0.3$$

Unskilled

$$1/10 = 0.1$$

Weighted average

$$\text{Weighted average} = (0.6)(300) + (0.3)(200) + (0.1)(100)$$

Change = 1500

$$\% \text{ Change} = (1500/1000) \times 100 = 150\%$$

Next day's sale = 2500

Next day's sale as % = $2500/1000 \times 100 = 250 \%$

Final fruit = 3 kg

Change = $3-15 = -12$

% change

% change = $-12/15 \times 100 = -80 \%$

Formula for change in Cell D21: = D20 - D19

Formula for %change in Cell D22: = D21/D19*100

Cell D21

Cell D21 = -12 kg

Cell D22

Cell D22 = -80 %

Final weight = 15 kg

Change = $15-3 = 12$

% change

% change = $12/3 \times 100 = 400 \%$

Formula for change in Cell D28: = D27 - D26

Formula for %change in Cell D29: = D28/D26*100

Calculation

= $5000(1 + 3\%)(1 + 2\%)(1 + 1\%)$

Formula for salary in year 2 in Cell C37:

Formula for salary in year 2 in Cell C37:

=ROUND(C35*(1+C36/100);0)

Formula for salary year 3 in Cell C39:

Formula for salary year 3 in Cell C39: =ROUND(C37*(1+C38/100);0)

Formula for salary at the end of year 3 in Cell C4

Formula for salary at the end of year 3 in Cell C41:

=ROUND(C39*(1+C39/100);0)

Formula for value in year 2 in Cell C48:

Formula for value in year 2 in Cell C48: =
 $\text{ROUND}(C46*(1+C47/100);0)$

Formula for value in year 3 in Cell C50:

Formula for value in year 3 in Cell C50: =
 $\text{ROUND}(C48*(1+C49/100);0)$

Formula for value in year 4 in Cell C52:

Formula for value in year 4 in Cell C52: =
 $\text{ROUND}(C50*(1+C51/100);0)$

Formula for salary end of year 4 in Cell C54:

Formula for salary end of year 4 in Cell C54: =
 $\text{ROUND}(C52*(1+C53/100);0)$

Decrease in interest rate

Decrease in interest rate = $7-9 = -2 \%$

% decrease = $-2/9 \times 100 = -22.2 \%$

Increase in interest rate = $9-7 = 2 \%$

Formula for decrease in Cell F6: = $F5-F4$

Formula for % decrease in Cell F7: = $F6/F4*100$

Cell F6

Cell F6 = -2

Cell F7

Cell F7 = -22.2

Formula for increase in Cell F16: = $F15-F14$

Formula for % increase in Cell F17: = $F16/F14*100$

Calculation

$100 * \text{Rs. } 62.50 = \text{Rs. } 6,250$

$0.02 * \text{Rs. } 6,250$

$0.02 * \text{Rs. } 6,250 = 125$

100 shares at Rs. 68 = 6,800.00

Commission at 1% = - 68.00

$$\text{Net receipts} = 6,732.00$$

$$\text{Total cost} = - 5,277.25$$

$$= 6,732 - 5,277.25 = 1,454.75$$

$$\text{Dividends } (100 \times 10/10) = 100.00$$

Return on investment

$$\text{Return on investment} = 1,554.75/5,277.25 \times 100$$

Formula for Cost of 100 shares at Rs. 52.25 in Cell

$$\text{Formula for Cost of 100 shares at Rs. 52.25 in Cell B23: } = B21 \times B22$$

Formula for Commission at 1% in Cell B24:

$$\text{Formula for Commission at 1% in Cell B24: } = B23 \times 0.01$$

Formula for sale of 100 shares at Rs. 68 in Cell B

$$\text{Formula for sale of 100 shares at Rs. 68 in Cell B29: } = B21 \times B28$$

Formula for Commission at 1% in Cell B30:

$$\text{Formula for Commission at 1% in Cell B30: } = B29 \times 0.01$$

Formula for Net Gain in Cell B36: $= B31 - B25$

$$\text{Formula for \% Gain in Cell B37: } = B36/B35 \times 100$$

then

$$I = P \cdot R \cdot T / 100$$

Find simple interest

$$I = P \times T \times R / 100$$

$$= 500 \times 4 \times 11/100$$

$$\text{Interest year 1} = 0.1 \times 800 = 80$$

$$\text{New } P = 800 + 80 = 880$$

$$\text{Interest on 880} = 0.1 \times 880 = 88$$

$$\text{New } P = 880 + 88 = 968$$

n = Number of periods

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

8 years.

$$S = P(1 + r/100)^8$$

$$= 750(1+12/100)^8$$

$$\text{Compound interest} = 1857 - 750 = 1107 \text{ Rs}$$

$$3646.5 = 3000(1+0.05)^n$$

$$3646.5/3000$$

$$3646.5/3000 = (1+0.05)^n$$

$$= \$1000 * [5.53]$$

$$= \$1000 * [4.33]$$

S

$$S = r ((1+i)^n - 1) / i$$

Accumulation factor for n payments

$$\text{Accumulation factor for n payments} = ((1+i)^n - 1) / i$$

(i.e. 10 % interest on 100 Rs. which is $100 * 10 / 100$)

(i.e. 10 % interest on 100 Rs. which is $100 * 10 / 100 = 10$ Rs. so total amount is

$$100 + 10$$

$$100 + 10 = 110 \text{ or}$$

= Payment per period x Discount Factor (DF)

$$\text{Formula for Discount Factor} = (1 - 1/(1+i)^n) / i$$

Discounted value

$$\text{Discounted value} = 10000 \times 12.4059 = 124059 \text{ Rs}$$

Amount of annuity = 2000Rs

$$\text{Rate of interest} = i = 11\% / 2 = 0.055$$

Number of periods

$$\text{Number of periods} = n = 10 \times 2 = 20$$

DISCOUNTED VALUE

$$\text{DISCOUNTED VALUE} = 2,000 \times ((1 - 1 / (1+0.055)^{20}) / 0.055)$$

the trinomial $2x^2 - 3x - 1$ is multiplied by $-x$.

$$= (-x)(2x^2) + (-x)(-3x) + (-x)(-1)$$

$$= -2x^3 + 3x^2$$

$$(32)(x^4 \cdot 2)(y^3 \cdot 2)/z^3 \cdot 2$$

$$(32)(x^4 \cdot 2)(y^3 \cdot 2)/z^3 \cdot 2 = 9 \times 8 \times 6 / 26$$

$$x(1-0.025)$$

$$x(1-0.025) = 341.25$$

$$B = 3$$

$$2A = 3 \times 3$$

$$\text{MDETERM}(A1:C3)$$

$$\text{MDETERM}(A1:C3) = A1 \cdot (B2 \cdot C3 - B3 \cdot C2) + A2 \cdot (B3 \cdot C1 - B1 \cdot C3) + A3 \cdot (B1 \cdot C2 - B2 \cdot C1)$$

Cell D57:

$$\text{Cell D57:} = B57 / B58$$

Cell D58:

$$\text{Cell D58:} = B58 / B58$$

Cell D59:

$$\text{Cell D59:} = B59 / B58$$

It can be rewritten as:

$$180,000/Y = 4/3$$

Solve

$$Y = (180,000 \times 3)/4$$

Now Ratio X: Y = (cell B70)/(cell B71)

$$\text{Ratio of sales} = (\text{cell D70})/(\text{cell D71})$$

Cell D71 is unknown. Hence:

$$(\text{cell D71}) = (\text{cell B71}) \times (\text{cell D70})/(\text{cell B70})$$

(cell D71)

$$(\text{cell D71}) = (\text{cell B71})/(\text{cell B70}) \times (\text{cell D70})$$

Thus the formula was:

$$= B71/B70 \cdot D70$$

$$500 X = 200 \times 100$$

$$X = (200 \times 100)/500 = 40$$

Other staff

$$Y = (150 \times 100)/500 = 30$$

Total = 2 litre

$$\text{Mango juice (X)} = (3/6) * 2 = 1 \text{ litre}$$

Here also the similar ratios were used.

$$\text{Mango} = B_{20}/B_{23} * D_{23}$$

Apple

$$\text{Apple} = B_{21}/B_{23} * D_{23}$$

Orange

$$\text{Orange} = B_{22}/B_{23} * D_{23}$$

3 : 2 : 1

$$\text{Total} = 3+2+1 = 6$$

Orange juice (Z) = 500 litre

$$\text{Punch} = 1000 + 667 + 500 = 2167 \text{ litre}$$

Here also ratios were used.

$$\text{Mango juice} = B_{45}/B_{47} * D_{47}$$

Apple juice

$$\text{Apple juice} = B_{46}/B_{47} * D_{47}$$

Check:

$$140 \times 30 = 4200$$

$$24 \times 176$$

$$24 \times 176 = 4224$$

First, convert the colon-notation ratios to fractions:

$$2/x = 3/9$$

$$(2x + 1) : 2$$

$$(2x + 1) : 2 = (x + 2) : 5$$

First, convert the colon-notation ratios to fractions:

$$(2x + 1)/2 = (x + 2)/5$$

Then solve:

$$5(2x + 1) = 2(x + 2)$$

$$10x + 5$$

$$10x + 5 = 2x + 4$$

Enter % Markup in cell B18.

Enter formula $= (1 + B18/100) * B17$ in cell B19. Here the term $1 + B18/100$ is the

Enter % Markdown 25 in cell B29.

Enter formula for Rs. Markdown $(= B29/100 * B28)$ in cell B30. Here the term $B29/100$

(

$= (1 - B29/100) * B28$) by using following formula

Amount of discount = dL

$$= 0.3 \times 3000 = 900 \text{ Rs.}$$

Enter % trade Discount 30 in cell B40.

Enter formula for Rs. Discount $= B40/100 * B3$ in cell B41. Here the term $B40/100$ is

Subtract 15% of L from L. Let the new price is L1.

$$L1 = L - (L \times 15\%)$$

Then subtract 10% of L1 from L1. Let the new price is L2.

$$L2 = L1 - (L1 \times 10\%)$$

N

$$N = L2 - (L2 \times 5\%)$$

N

$$N = L (1 - d1)(1 - d2)(1 - d3)$$

Remember: total discount is not $15\% + 10\% + 5\%$

Remember: total discount is not $15\% + 10\% + 5\% = 30\%$

For series trade Discount

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

Net price

$$\text{Net price} = 20,000(1-0.2)(1-0.10)(1-0.05)$$

$$\text{Net Price} = L(1 - d)$$

$$L = N / (1 - d)$$

$$= 2100 / (1 - 0.3)$$

$$= 2100 / (0.7)$$

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

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

$$= 100(1 - 15\%)(1 - 10\%)(1 - 5\%)$$

$$= 72.68$$

$$\% \text{ Discount} = 100 - 72.68$$

$$= 100 * (1-0.15) * (1-0.1) * (1-0.05)$$

Let Rs 100 is the list price then

$$\text{Net price} = 100(1 - 0.2)(1 - 0.08)(1 - 0.02)$$

EXCEL formula for net price was based on the calculation

$$= 100 * (1-0.2) * (1-0.08) * (1-0.02)$$

$$N = L(1 - d)$$

$$= 50,000(1-0.02)$$

Markup

$$\text{Markup} = 100 - 50 \times 100\% = 100\%$$

Margin

$$\text{Margin} = 100 - 50 \times 100\% = 50\%$$

Thus, the selling price

$$= 9,000 + 3,000 \text{ Rs.}$$

If the Markup on cost 33% then...

$$\text{Selling Price (S)} = \text{Cost (C)} + \{\text{Cost (C)} \times \text{Markup on cost (MUC)}\}$$

S

$$S = C + (C \times MUC)$$

%Markup

$$\%Markup = 5/10 \times 100\% = 50\%$$

$$= C(1 + MUC)$$

Selling price

$$= 1,500 \times (1 + 0.6)$$

$$= 60/100 \times 1500.$$

Sale price $S = \text{Cost } C + \{C \times \text{Markup on cost (MUC)}\}$

$$S = C + 0.40(C)$$

$$35 = 1.40(C)$$

$$C = 35/1.4 = 25 \text{ Rs.}$$

Markup on Selling Price

$$\text{Markup on Selling Price} = (0.5/2.5) \times 100\%$$

$$= E32/E31 \times 100.$$

Selling Price S

$$\text{Selling Price } S = 1,500 + 0.6S$$

$$S - 0.6S$$

$$S - 0.6S = 1,500 \text{ Rs.}$$

Selling Price =

$$35 = C + (0.4 \times 35)$$

$$35$$

$$35 = C + 14$$

Or, alternatively

$$C = S - 0.4S$$

$$0.6S$$

$$0.6S = C = S(1 - \text{mus}).$$

mus

$$mus = muc / (1 + muc)$$

% Markup on cost

$$\% \text{ Markup on cost} = \% \text{ Markup on } S / (1 - \% \text{ Markup on } S)$$

muc

$$muc = mus / (1 - mus)$$

Markup on cost

$$\text{Markup on cost} = 0.3333 / (1 - 0.333)$$

Here 33.3 is the Markup on sale in cell E61.

EXCEL formula in cell E62 for Markup on cost was =
 $(E61/100)/(1-E61/100)*100$.

% Markdown

$$\% \text{ Markdown} = \text{Markdown} \times 100\%$$

Old S

$$\% \text{ Markdown} = 140 \times 100\%$$

$$= 0.28 \times 100\%$$

$$2x - 3y = -6$$

$$x + y = 2$$

$$2x - 3y = -6$$

$$2x + 2y = 4$$

$$2x - 3(2) = -6$$

$$2x - 6 = -6$$

Equation 1:

$$2x - 3y = -6$$

$$LHS = 2x - 3y = 2(0) - 3(2)$$

$$= -6 = RHS$$

Equation 2:

$$x + y = 2$$

LHS

$$LHS = x + y = 0 + 2 = 2 = RHS$$

Equation 1

$$1.10x + 0.98y = 84.40$$

Eliminate x in (1) by Dividing both sides by 1.10.

$$(1.10x + 0.98y)/1.10 = 84.40/1.10$$

$$x + 0.8909y$$

$$x + 0.8909y = 76.73$$

Equation 2

$$1.15x + 1.14y = 91.7$$

Eliminate x in (2) by Dividing both sides by 1.15

$$(1.15x + 1.14y)/1.15 = 91.70/1.15$$

$$x + 0.9913y$$

$$x + 0.9913y = 79.74$$

$$0.1004y = 3.01$$

$$y = 3.01/0.1004$$

$$1.10x + 0.98y$$

$$1.10x + 0.98y = 84.40$$

Result:

$$1.10x + 0.98(29.98) = 84.40$$

Solve:

$$1.10x + 29.38 = 84.40$$

$$1.10x$$

$$1.10x = 84.40 - 29.38$$

BEP in Rs

$$BEP \text{ in Rs} = \text{Fixed Costs} \times \text{Net Sales}$$

BEP in Rs

$$BEP \text{ in Rs} = \text{Fixed costs} \times \text{Selling Price per unit}$$

BEP as % of capacity

$$\text{BEP as \% of capacity} = \text{BEP in units} \times 100 \%$$

Contribution Margin per unit = $CM = S - VC$

$$\text{Contribution Rate} = CR = CM/S \times 100\%$$

*Break Even Point (BEP):

$$\dots \text{in Units (x): } Rs. x = (FC / CM)$$

...in Sales Rs. : Rs. x

$$\dots \text{in Sales Rs. : } Rs. x = (FC / CM) * S$$

Break Even Point:

$$\text{In Units, } x = FC / CM = 8640/20 = 432 \text{ Units}$$

In Rs, $x = (FC / CM) * S =$

$$(Rs. 8640/Rs.20) * Rs.50 = Rs.21,600$$

% of Capacity

$$\% \text{ of Capacity} = \text{BEP in units} / PC \times 100\%$$

$$= 432 / 900 \times 100\%$$

Break Even Point

$$\dots \text{in units} = FC / CM$$

BEP in units

$$\text{BEP in units} = 3136/28 = 112 \text{ Units}$$

Break Even Point

$$\dots \text{in Rupees} = (FC / CM) * S$$

$$= (3136/28) * 185 = 20720 \text{ Rs.}$$

$$= 112/320 \times 100\%$$

BEP in units = FC/CM

$$= Rs. 2688 / Rs.28$$

Step 3... Find % of Capacity

$$\text{BEP as a \% of capacity} = \text{BEP in units} / PC \times 100\%$$

$$= 96/320 \times 100\%$$

$$\begin{aligned} \text{BEP in units} &= \text{FC}/\text{CM} \\ &= \text{Rs. } 4588 / \text{Rs. } 37 \end{aligned}$$

$$\begin{aligned} \text{BEP as a \% of capacity} &= \text{BEP in units} / \text{PC} \times 100\% \\ &= 124/320 \times 100\% \end{aligned}$$

$$\begin{aligned} \text{BEP in units} &= \text{FC}/\text{CM} \\ &= \text{Rs. } 3136 / \text{Rs. } 14 \end{aligned}$$

$$\begin{aligned} \text{BEP as a \% of capacity} &= \text{BEP in units} / \text{PC} \times 100\% \\ &= 224/320 \times 100\% \end{aligned}$$

$$\begin{aligned} \text{BEP in units} &= \text{FC}/\text{CM} \\ &= \text{Rs. } 3136 / \text{Rs. } 28 \end{aligned}$$

Hence:

Company had a net income (NI) of $22 * \text{Rs. } 28 = \text{Rs. } 616$

$$\begin{aligned} S &= 185 \text{ Rs per unit} \\ VC &= -157 \text{ Rs per unit} \end{aligned}$$

$$\begin{aligned} \text{Number of units above BEP} &= \text{NI} / \text{CM} \\ &= \text{Rs. } 2000 / \text{Rs. } 28 \end{aligned}$$

$$\begin{aligned} S &= 185 \text{ Rs per unit} \\ VC &= -157 \text{ Rs per unit} \\ &= 112 - 12 = 100 \end{aligned}$$

Number of units sale above BEP in units

Number of units sale above BEP in units = - Net loss_____

$$\begin{aligned} &= - 336 / 28 = -12 \\ &= 112 + (-12) = 100 \end{aligned}$$

Step 3... Find units over BEP

$$\text{Units produced} = 320 * 0.85 = 272 \text{ Units}$$

Hence:

$$\text{Net income} = \text{NI} = 160 \text{ Units} * 28 = 4480 \text{ Rs.}$$

For example, the mean of 4, 8, and 9 is

$$(4 + 8 + 9)/3 = 7$$

$$\text{Sum} = 596$$

$$\text{Mean} = 596/8 = 74.5$$

Range = Maximum value - Minimum Value

$$\text{Thus, Range} = 58 - 12 = 46$$

Step 6: Compute Class Midpoints

$$\text{Class Midpoint} = (\text{Lower limit} + \text{Upper limit})$$

First midpoint is $(10+19)/2$

$$\text{First midpoint is } (10+19)/2 = 14.5$$

Other midpoints are:

$$(20+29)/2 = 24.5$$

$$(30+39)/2$$

$$(30+39)/2 = 34.5$$

$$(40+49)/2$$

$$(40+49)/2 = 44.5$$

$$(50+59)/2$$

$$(50+59)/2 = 54.5$$

There are 3 observations in first class interval 10 - 19.

The relative frequency is $3/20 = 0.15$.

$$10 - 19 : 3$$

$$20 - 29 : 3 + 6 = 9$$

$$30 - 39 : 3 + 6 + 5$$

$$30 - 39 : 3 + 6 + 5 = 14$$

$$40 - 49 : 3 + 6 + 5 + 4$$

$$40 - 49 : 3 + 6 + 5 + 4 = 18$$

$$50 - 59 : 3 + 6 + 5 + 4 + 2$$

$$50 - 59 : 3 + 6 + 5 + 4 + 2 = 20$$

$$10 - 19 : 15$$

$$20 - 29 : 15 + 30 = 45$$

$$30 - 40 : 15 + 30 + 25$$

$$30 - 40 : 15 + 30 + 25 = 70$$

$$40 - 50 : 15 + 30 + 25 + 20$$

$$40 - 50 : 15 + 30 + 25 + 20 = 90$$

$$50 - 60 : 15 + 30 + 25 + 20 + 10$$

$$50 - 60 : 15 + 30 + 25 + 20 + 10 = 100$$

the formula

the formula =ROUND(H61/D61,0).

limits) Type the formula

limits) Type the formula =FREQUENCY(A3:A1,B3:B5) Then,
CTRL+Shift+Enter

is as under:

$$G = (x_1 \cdot x_2 \cdot x_3 \cdot \dots \cdot x_n)^{(1/n)}$$

Find GM of 130, 140, 160

$$GM = (130 \cdot 140 \cdot 160)^{(1/3)}$$

Syntax

$$1st \text{ Quartile } Q_1 = (n+1)/4$$

2nd Quartile Q2

$$2nd \text{ Quartile } Q_2 = 2(n+1)/4$$

3rd Quartile Q3

$$3rd \text{ Quartile } Q_3 = 3(n+1)/4$$

Grouped data

$$Q_i = \text{ith Quartile} = l + h/f[\text{Sum } f/4 \cdot i - cf]$$

Syntax

$$1st \text{ Decile } D_1 = (n+1)/10$$

2nd Decile D2

$$2nd \text{ Decile } D_2 = 2(n+1)/10$$

9th Deciled D₉

$$9\text{th Deciled } D_9 = 9(n+1)/10$$

Grouped data

$$Q_i = \text{ith Decile } (i=1, 2, \dots, 9) = l + h/f[\text{Sum } f/10 \times i - cf]$$

Syntax

$$1\text{st Percentile } P_1 = (n+1)/100$$

2nd Decile D₂

$$2\text{nd Decile } D_2 = 2(n+1)/100$$

99th Deciled D₉

$$99\text{th Deciled } D_9 = 99(n+1)/100$$

Grouped data

$$Q_i = \text{ith Decile } (i=1, 2, \dots, 9) = l + h/f[\text{Sum } f/100 \times i - cf]$$

mode = 15, mean = 18, median = ?

$$\text{Median} = 1/3[\text{mode} + 2 \text{ mean}]$$

$$= 1/3[15 + 2(18)]$$

Q₁

$$Q_1 = 2\text{nd value} + 0.5 \times (3\text{rd value} - 2\text{nd value})$$

$$= 12 + 0.5 \times (13 - 12)$$

$$= 12 + 0.5 \times 1$$

So, Q₃

$$\text{So, } Q_3 = 7\text{th value} + 0.5 \times (8\text{th value} - 7\text{th value})$$

$$= 18 + 0.5 \times (21 - 18)$$

$$= 18 + 0.5 \times 3$$

Midhinge is the average of the first and third quartiles.

$$\text{Midhinge} = Q_1 + Q_3$$

So Q₁

$$\text{So } Q_1 = 2\text{nd value} + 0.75 \times (3\text{rd value} - 2\text{nd value})$$

$$= 8 + 0.75 \times (9 - 8)$$

$$= 8 + 0.75 \times 1$$

$$\text{Position of } Q3 = 3 \times (10 + 1) / 4 = 3 \times (2.75) = 8.25$$

$$\text{So } Q3 = 8\text{th value} + 0.25(9\text{th value} - 8\text{th value})$$

$$= 20 + 0.25 \times (22 - 20)$$

Mean

$$\text{Mean} = 360/9 = 40 \text{ marks}$$

$$= 40/9 = 4.4 \text{ marks}$$

$$= 39/9 = 4.3 \text{ marks}$$

Cell F73: S_x (

$$\text{Cell F73: } S_x (=SQRT(C72/5-F72*F72))$$

Cell G73: S_y

$$\text{Cell G73: } S_y (=SQRT(D72/5-G72*G72))$$

Cell H73: $Cov(x,y)$ (

$$\text{Cell H73: } Cov(x,y) (=E72/5-F72*G72)$$

Cell H74: Correlation coefficient (

$$\text{Cell H74: Correlation coefficient } (=H73/(F73*G73))$$

Y

$$Y = a + bX.$$

Y_i

$$Y_i = a + bX_i + e_i$$

$$= 102/9 = 11.33$$

$$= 302/9 = 33.56$$

P-value

$$P\text{-value} = 0.000133.$$

$$= 16452/7 = 2350.29$$

$$= 35913/7 = 5130.429$$

$$\text{Drop } 170; \text{ Add } 176; = (176-170)/3 = 6/3 = 2$$

$$\text{Last average} + 2 = 180 + 2 = 182$$

Day 1, Afternoon

$$\text{Actual} - \text{Trend} = 140 - 180 = -40$$

$$\text{Actual value} = 140$$

$$\text{Random variation} = 140 - 144 = -4$$

Trend = 180 to 195 (6 intervals)

$$= 15/6 = 2.5 \text{ per period}$$

Seasonal variation as already worked out

$$\text{Seasonal variation as already worked out} = -8$$

Please refer to the Example discussed in Handout 33.

$$\text{Let } \alpha = 0.3$$

Then:

$$F(t) = F(t-1) + (\alpha(t-1) - F(t-1))$$

$$= \alpha(t-1) + (1-\alpha)F(t-1)$$

$$F(t-1)$$

$$F(t-1) = \alpha(t-2) + (1-\alpha)F(t-2)$$

Substituting

$$F_3 = \alpha(t-1) + (1-\alpha)[\alpha(t-2) + (1-\alpha)F(t-2)]$$

$$= [\alpha(t-1) + (1-\alpha)\alpha(t-2)] + (1-\alpha)^2F(t-2)$$

In general

$$n! = n(n-1)(n-2)\dots 3.2.1 \text{ or}$$

$$n!$$

$$n! = n(n-1)(n-2)!$$

Number of permutations of n objects taken r at a time =

$${}_nP_r = n!/(n-r)!$$

Formula

$${}_nP_r = \frac{n!}{n1!n2!..nk!}$$

${}_nC_r$

$${}_nC_r = \frac{n!}{r!(n-r)!}$$

e.g., ${}_4C_0 = {}_4C_4 = 1$

$${}_nC_1 = {}_nC_{n-1} = n$$

We can verify that:

$$(x+y)^1 = x + y$$

$$(x+y)^2$$

$$(x+y)^2 = x^2 + 2xy + y^2$$

$$(x+y)^3$$

$$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$$(x+y)^4$$

$$(x+y)^4 = x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

written in combinatorial notation:

$$(x+y)^5 = {}_5C_0 \cdot x^5 + {}_5C_1 x^4 y + {}_5C_2 x^3 y^2 + {}_5C_3 x^2 y^3 + {}_5C_4 x y^4 + {}_5C_5 y^5$$

Solving:

$$= x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5$$

First term = x^5

Last term = y^5

Second coefficient = $5/1 = 5$

Third coefficient = $5 \cdot 4/2 = 10$

Fourth coefficient

Fourth coefficient = $10 \cdot 3/3 = 10$

Fifth coefficient

Fifth coefficient = $10 \cdot 2/4 = 5$

occurring

occurring = $p(\text{Rashid}) = 1/600$

$p(\text{woman})$

$$p(\text{woman}) = 250/600$$

When A and B are mutually exclusive:

$$p(A \text{ or } B) = p(A) + p(B)$$

divisible by three?

$$p(\text{even}) = 3/6$$

$p(\text{div by } 3)$

$$p(\text{div by } 3) = 2/6$$

Solution

$$p(\text{woman chosen}) = 2/5$$

Probabilities of all these events together add up to 1.

$$p(A) + p(B) + p(C) + \dots + p(N) = 1$$

$p(A) + p(B) + p(C)$

$$p(A) + p(B) + p(C) = 1$$

$p(\text{1st working}) = 1 - p(\text{1st not working}) = 1 - 1/10 = 9/10$

$$p(\text{2nd working}) = 19/20$$

$p(\text{3rd working})$

$$p(\text{3rd working}) = 39/40$$

$p(\text{all working}) = 9/10 \times 19/20 \times 39/40$

$$p(\text{all working}) = 9/10 \times 19/20 \times 39/40 = 6669/8000$$

$p(\text{caught only on second occasion})$

$$p(\text{caught only on second occasion}) = \frac{3}{4} \times \frac{1}{4} \times \frac{3}{4} = 9/64$$

$p(\text{caught}) =$

$$p(\text{dismissed 1}) + p(\text{dismissed 2}) + p(\text{dismissed 3}) = \frac{4}{64} + \frac{3}{64} + \frac{3}{64}$$

$p(\text{not caught}) = 1 - p(\text{not caught})$

$$= 1 - 10/64$$

by three?

$$P(\text{odd}) = 3/6$$

60% workforce are men.

$$p(\text{man chosen}) = 3/5$$

not being caught was $1 - 1/4$

$$\text{not being caught was } 1 - 1/4 = 3/4.$$

Now the probabilities can be calculated as follows:

$$1C \& 2C (1/4 \times 1/4 = 1/16)$$

$$1C \& 2NC \& 3C (1/4 \times 3/4 \times 1/4)$$

$$1C \& 2NC \& 3C (1/4 \times 3/4 \times 1/4 = 3/64)$$

$$1C \& 2NC \& 3NC (1/4 \times 3/4 \times 3/4)$$

$$1C \& 2NC \& 3NC (1/4 \times 3/4 \times 3/4 = 9/64)$$

$$1NC \& 2C \& 3C (3/4 \times 1/4 \times 1/4)$$

$$1NC \& 2C \& 3C (3/4 \times 1/4 \times 1/4 = 3/64)$$

$$1NC \& 2C \& 3NC (3/4 \times 1/4 \times 3/4)$$

$$1NC \& 2C \& 3NC (3/4 \times 1/4 \times 3/4 = 9/64)$$

$$1NC \& 2NC \& 3C (3/4 \times 3/4 \times 1/4)$$

$$1NC \& 2NC \& 3C (3/4 \times 3/4 \times 1/4 = 9/64)$$

$$1NC \& 2NC \& 3NC (3/4 \times 3/4 \times 3/4)$$

$$1NC \& 2NC \& 3NC (3/4 \times 3/4 \times 3/4 = 27/64)$$

First Caught, Second Caught, Dismissed:

$$1C (1/4) \& 2C (1/4) (\text{Dismissed } 1) (1/16 = 4/64)$$

$p(\text{not caught})$

$$= 1 - p(\text{caught})$$

Solution:

$$P(A \text{ gets first or } A \text{ gets second}) = 3/4 + 3/4 = 6/4$$

Split "A gets first or the second or both" into 3 parts

$$A \text{ gets first but not second} = 3/4 \times 1/4 = 3/16$$

A does not get first but gets second

$$A \text{ does not get first but gets second} = 1/4 \times 3/4 = 3/16$$

A gets both

$$A \text{ gets both} = \frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$$

$$\text{Management female} = 0.25 \times 40 = 10$$

$$\text{Non-Management female} = 40 - 10 = 30$$

$$\text{Management male} = 0.3 \times 60 = 18$$

$$\text{Non-Management male} = 60 - 18 = 42$$

Management total

$$\text{Management total} = 18 + 10 = 28$$

Non-Management total

$$\text{Non-Management total} = 42 + 30 = 72$$

Total 100 203000

$$\text{Mean/day} = 203000/100 = 2030$$

Applying the formula above:

$$EMV = 0.8 \times 0 + 0.15 \times 5000 + 0.05 \times 50000$$

$$= 0 + 750 + 2500$$

$$= 1/20 = 0.05).$$

$$12 + 5$$

$$12 + 5 = 17$$

$$12 - 5$$

$$12 - 5 = 7$$

$$(4)^2$$

$$(4)^2 = 16$$

$$(4)^{1/2}$$

$$(4)^{1/2} = 2$$

Addition. Symbol: +

(Example: =5+4 Result: 9)

Subtraction. Symbol: -

(Example: =5-4 Result: 1)

Multiplication. Symbol: * (Example:
Multiplication. Symbol: * (Example: =5*4 Result: 20)

(Example:
(Example: =12/4 Result: 3)

(Example:
(Example: =5^2 Result: 25)

The formula was written in cell G34. The formula was:
=5+10+15+20+30+40

Is any add back to the income of the company?
% Allowances = $(5000/10000) \times 100 = 50\%$

Is any add back to the income of the company?
% Allowances = $(7000/10000) \times 100 = 70\%$

Utilities allowance = $0.025 \times 10000 = 250$ Rs.
Thus total allowances are $4500+250+250 = 5000$ Rs

percent of gross salary?
Gross salary = $10000 + 5000 = 15,000$ Rs.

Group insurance/medical
Group insurance/medical = $0.05 \times 15000 = 750$ Rs.

20% or 20/100
20% or $20/100=0.2$

Base = 120
Percentage = $20/100 \times 120$

Percentage = 96
Base= $96/0.24=400$

There are 5 data values
Average = $55/5 = 11$

1. Add numbers in a cell
Type =5+10 in a cell

corresponding weights of the data then

$$\text{Weighted average} = (x_1)(w_1) + (x_2)(w_2) + (x_3)(w_3) + \dots + (x_n)(w_n)$$

Ahmad's overall grade

$$\text{Ahmad's overall grade} = (0.10)(92) + (0.20)(68) + (0.70)(81)$$

to fraction. Total labor hours

$$\text{to fraction. Total labor hours} = 6 + 3 + 1 = 10$$

Skilled

$$6/10 = 0.6$$

Semiskilled

$$3/10 = 0.3$$

Unskilled

$$1/10 = 0.1$$

Weighted average

$$\text{Weighted average} = (0.6)(300) + (0.3)(200) + (0.1)(100)$$

Change = 1500

$$\% \text{ Change} = (1500/1000) \times 100 = 150\%$$

Next day's sale = 2500

$$\text{Next day's sale as } \% = 2500/1000 \times 100 = 250 \%$$

Final fruit = 3 kg

$$\text{Change} = 3 - 15 = -12$$

% change

$$\% \text{ change} = -12/15 \times 100 = -80 \%$$

Formula for change in Cell D21: = D20 - D19

$$\text{Formula for \%change in Cell D22:} = D21/D19 * 100$$

Cell D21

$$\text{Cell D21} = -12 \text{ kg}$$

Cell D22

$$\text{Cell D22} = -80 \%$$

Final weight = 15 kg

Change = $15 - 3 = 12$

% change

% change = $12/3 \times 100 = 400\%$

Formula for change in Cell D28: = D27 - D26

Formula for %change in Cell D29: = D28/D26*100

Calculation

= $5000(1 + 3\%)(1 + 2\%)(1 + 1\%)$

Formula for salary in year 2 in Cell C37:

Formula for salary in year 2 in Cell C37:

=ROUND(C35*(1+C36/100);0)

Formula for salary year 3 in Cell C39:

Formula for salary year 3 in Cell C39: =ROUND(C37*(1+C38/100);0)

Formula for salary at the end of year 3 in Cell C4

Formula for salary at the end of year 3 in Cell C41:

=ROUND(C39*(1+C39/100);0)

Formula for value in year 2 in Cell C48:

Formula for value in year 2 in Cell C48: =

ROUND(C46*(1+C47/100);0)

Formula for value in year 3 in Cell C50:

Formula for value in year 3 in Cell C50: =

ROUND(C48*(1+C49/100);0)

Formula for value in year 4 in Cell C52:

Formula for value in year 4 in Cell C52: =

ROUND(C50*(1+C51/100);0)

Formula for salary end of year 4 in Cell C54:

Formula for salary end of year 4 in Cell C54: =

ROUND(C52*(1+C53/100);0)

Decrease in interest rate

Decrease in interest rate = $7 - 9 = -2\%$

$$\% \text{ decrease} = -2/9 \times 100 = -22.2 \%$$

$$\text{Increase in interest rate} = 9-7 = 2 \%$$

$$\text{Formula for decrease in Cell F6:} = F5-F4$$

$$\text{Formula for \% decrease in Cell F7:} = F6/F4*100$$

Cell F6

$$\text{Cell F6} = -2$$

Cell F7

$$\text{Cell F7} = -22.2$$

$$\text{Formula for increase in Cell F16:} = F15-F14$$

$$\text{Formula for \% increase in Cell F17:} = F16/F14*100$$

Calculation

$$100 * \text{Rs. } 62.50 = \text{Rs. } 6,250$$

$$0.02 * \text{Rs. } 6,250$$

$$0.02 * \text{Rs. } 6,250 = 125$$

$$100 \text{ shares at Rs. } 68 = 6,800.00$$

$$\text{Commission at } 1\% = - 68.00$$

$$\text{Net receipts} = 6,732.00$$

$$\text{Total cost} = - 5,277.25$$

$$= 6,732 - 5,277.25 = 1,454.75$$

$$\text{Dividends } (100*10/10) = 100.00$$

Return on investment

$$\text{Return on investment} = 1,554.75/5,277.25*100$$

Formula for Cost of 100 shares at Rs. 52.25 in Cell

$$\text{Formula for Cost of 100 shares at Rs. 52.25 in Cell B23:} = B21*B22$$

Formula for Commission at 1% in Cell B24:

$$\text{Formula for Commission at 1% in Cell B24:} = B23*0.01$$

Formula for sale of 100 shares at Rs. 68 in Cell B

$$\text{Formula for sale of 100 shares at Rs. 68 in Cell B29:} = B21*B28$$

Formula for Commission at 1% in Cell B30:

$$\text{Formula for Commission at 1\% in Cell B30:} = B29 * 0.01$$

Formula for Net Gain in Cell B36: $= B31 - B25$

$$\text{Formula for \% Gain in Cell B37:} = B36 / B35 * 100$$

then

$$I = P \cdot R \cdot T / 100$$

Find simple interest

$$I = P \times T \times R / 100$$

$$= 500 \times 4 \times 11 / 100$$

Interest year 1 = $0.1 \times 800 = 80$

$$\text{New } P = 800 + 80 = 880$$

Interest on 880 = $0.1 \times 880 = 88$

$$\text{New } P = 880 + 88 = 968$$

n = Number of periods

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

8 years.

$$S = P(1 + r/100)^8$$

$$= 750(1 + 12/100)^8$$

Compound interest = $1857 - 750 = 1107 \text{ Rs}$

$$3646.5 = 3000(1 + 0.05)^n$$

$$3646.5 / 3000$$

$$3646.5 / 3000 = (1 + 0.05)^n$$

$$= \$1000 * [5.53]$$

$$= \$1000 * [4.33]$$

S

$$S = r ((1+i)^n - 1) / i$$

Accumulation factor for n payments

$$\text{Accumulation factor for } n \text{ payments} = ((1 + i)^n - 1) / i$$

(i.e. 10 % interest on 100 Rs. which is $100 \times 10 / 100$)

(i.e. 10 % interest on 100 Rs. which is $100 \times 10 / 100 = 10$ Rs. so total amount is

$$100 + 10$$

$$100 + 10 = 110 \text{ or}$$

= Payment per period $\times$ Discount Factor (DF)

$$\text{Formula for Discount Factor} = (1 - 1 / (1 + i)^n) / i$$

Discounted value

$$\text{Discounted value} = 10000 \times 12.4059 = 124059 \text{ Rs}$$

Amount of annuity = 2000Rs

$$\text{Rate of interest} = i = 11\% / 2 = 0.055$$

Number of periods

$$\text{Number of periods} = n = 10 \times 2 = 20$$

DISCOUNTED VALUE

$$\text{DISCOUNTED VALUE} = 2,000 \times ((1 - 1 / (1 + 0.055)^{20}) / 0.055)$$

the trinomial $2x^2 - 3x - 1$ is multiplied by $-x$.

$$= (-x)(2x^2) + (-x)(-3x) + (-x)(-1)$$

$$= -2x^3 + 3x^2$$

$$(32)(x^4 \cdot 2)(y^3 \cdot 2) / z^3 \cdot 2$$

$$(32)(x^4 \cdot 2)(y^3 \cdot 2) / z^3 \cdot 2 = 9 \times 8 \times y^6 / z^6$$

$$x(1 - 0.025)$$

$$x(1 - 0.025) = 341.25$$

$$B = 3$$

$$2A = 3 \times 3$$

MDETERM(A1:C3)

$$\text{MDETERM}(A1:C3) = A1 \times (B2 \times C3 - B3 \times C2) + A2 \times (B3 \times C1 - B1 \times C3) + A3 \times (B1 \times C2 - B2 \times C1)$$

Cell D57:

$$\text{Cell D57:} = B57 / B58$$

Cell D58:

$$\text{Cell D58} = B58 / B58$$

Cell D59:

$$\text{Cell D59} = B59 / B58$$

It can be rewritten as:

$$180,000/Y = 4/3$$

Solve

$$Y = (180,000 \times 3)/4$$

Now Ratio X: Y = (cell B70)/(cell B71)

$$\text{Ratio of sales} = (\text{cell D70})/(\text{cell D71})$$

Cell D71 is unknown. Hence:

$$(\text{cell D71}) = (\text{cell B71}) \times (\text{cell D70})/(\text{cell B70})$$

(cell D71)

$$(\text{cell D71}) = (\text{cell B71})/(\text{cell B70}) * (\text{cell D70})$$

Thus the formula was:

$$=B71/B70*D70$$

$$500 X = 200 \times 100$$

$$X = (200 \times 100)/500 = 40$$

Other staff

$$Y = (150 \times 100)/500 = 30$$

Total = 2 litre

$$\text{Mango juice (X)} = (3 / 6) * 2 = 1 \text{ litre}$$

Here also the similar ratios were used.

$$\text{Mango} = B20/B23*D23$$

Apple

$$\text{Apple} = B21/B23*D23$$

Orange

$$\text{Orange} = B22/B23*D23$$

$$3 : 2 : 1$$

$$\text{Total} = 3+2+1 = 6$$

Orange juice (Z) = 500 litre

$$\text{Punch} = 1000 + 667 + 500 = 2167 \text{ litre}$$

Here also ratios were used.

$$\text{Mango juice} = B45/B47 * D47$$

Apple juice

$$\text{Apple juice} = B46/B47 * D47$$

Check:

$$140 \times 30 = 4200$$

$$24 \times 176$$

$$24 \times 176 = 4224$$

First, convert the colon-notation ratios to fractions:

$$2/x = 3/9$$

$$(2x + 1) : 2$$

$$(2x + 1) : 2 = (x + 2) : 5$$

First, convert the colon-notation ratios to fractions:

$$(2x + 1)/2 = (x + 2)/5$$

Then solve:

$$5(2x + 1) = 2(x + 2)$$

$$10x + 5$$

$$10x + 5 = 2x + 4$$

Enter % Markup in cell B18.

Enter formula $= (1+B18/100) * B17$ in cell B19. Here the term $1+B18/100$ is the

Enter % Markdown 25 in cell B29.

Enter formula for Rs. Markdown $(=B29/100 * B28)$ in cell B30. Here the term $B29/100$

(

$(= (1 - B29/100) * B28)$ by using following formula

Amount of discount = dL

$$= 0.3 \times 3000 = 900 \text{ Rs.}$$

Enter % trade Discount 30 in cell B40.

Enter formula for Rs. Discount = $B40/100 * B3$ in cell B41. Here the term $B40/100$ is

Subtract 15% of L from L . Let the new price is L_1 .

$$L_1 = L - (L \times 15\%)$$

Then subtract 10% of L_1 from L_1 . Let the new price is L_2 .

$$L_2 = L_1 - (L_1 \times 10\%)$$

N

$$N = L_2 - (L_2 \times 5\%)$$

N

$$N = L (1 - d_1)(1 - d_2)(1 - d_3)$$

Remember: total discount is not $15\% + 10\% + 5\%$

Remember: total discount is not $15\% + 10\% + 5\% = 30\%$

For series trade Discount

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

Net price

$$\text{Net price} = 20,000(1 - 0.2)(1 - 0.10)(1 - 0.05)$$

Net Price = $L(1 - d)$

$$L = N / (1 - d)$$

$$= 2100 / (1 - 0.3)$$

$$= 2100 / (0.7)$$

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

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

$$= 100(1 - 15\%)(1 - 10\%)(1 - 5\%)$$

$$= 72.68$$

$$\% \text{ Discount} = 100 - 72.68$$

$$= 100 \times (1 - 0.15) \times (1 - 0.1) \times (1 - 0.05)$$

Let Rs 100 is the list price then

$$\text{Net price} = 100(1 - 0.2)(1 - 0.08)(1 - 0.02)$$

EXCEL formula for net price was based on the calculation

$$= 100 \times (1 - 0.2) \times (1 - 0.08) \times (1 - 0.02)$$

$$N = L(1 - d)$$

$$= 50,000(1 - 0.02)$$

Markup

$$\text{Markup} = 100 - 50 \times 100\% = 100\%$$

Margin

$$\text{Margin} = 100 - 50 \times 100\% = 50\%$$

Thus, the selling price

$$= 9,000 + 3,000 \text{ Rs.}$$

If the Markup on cost 33% then...

$$\text{Selling Price (S)} = \text{Cost (C)} + \{\text{Cost (C)} \times \text{Markup on cost (MUC)}\}$$

S

$$S = C + (C \times MUC)$$

%Markup

$$\% \text{Markup} = 5/10 \times 100\% = 50\%$$

$$= C(1 + MUC)$$

Selling price

$$= 1,500 \times (1 + 0.6)$$

$$= 60/100 \times 1500.$$

Sale price $S = \text{Cost } C + \{C \times \text{Markup on cost (MUC)}\}$

$$S = C + 0.40(C)$$

$$35 = 1.40(C)$$

$$C = 35/1.4 = 25 \text{ Rs.}$$

Markup on Selling Price

$$\text{Markup on Selling Price} = (0.5/2.5) \times 100\%$$

$$= E32/E31 * 100.$$

Selling Price S

$$\text{Selling Price } S = 1,500 + 0.6S$$

$$S - 0.6S$$

$$S - 0.6S = 1,500 \text{ Rs.}$$

Selling Price =

$$35 = C + (0.4 \times 35)$$

$$35$$

$$35 = C + 14$$

Or, alternatively

$$C = S - 0.4 S$$

$$0.6S$$

$$0.6S = C = S(1 - \text{mus}).$$

mus

$$\text{mus} = \text{muc} / (1 + \text{muc})$$

% Markup on cost

$$\% \text{ Markup on cost} = \% \text{ Markup on } S / (1 - \% \text{ Markup on } S)$$

muc

$$\text{muc} = \text{mus} / (1 - \text{mus})$$

Markup on cost

$$\text{Markup on cost} = 0.3333 / (1 - 0.333)$$

Here 33.3 is the Markup on sale in cell E61.

EXCEL formula in cell E62 for Markup on cost was =
(E61/100)/(1-E61/100)*100.

% Markdown

$$\% \text{ Markdown} = \text{Markdown} \times 100\%$$

Old S

$$\% \text{ Markdown} = 140 \times 100\%$$

$$= 0.28 \times 100\%$$

$$2x - 3y = -6$$

$$x + y = 2$$

$$2x - 3y = -6$$

$$2x + 2y = 4$$

$$2x - 3(2) = -6$$

$$2x - 6 = -6$$

Equation 1:

$$2x - 3y = -6$$

$$LHS = 2x - 3y = 2(0) - 3(2)$$

$$= -6 = RHS$$

Equation 2:

$$x + y = 2$$

LHS

$$LHS = x + y = 0 + 2 = 2 = RHS$$

Equation 1

$$1.10x + 0.98y = 84.40$$

Eliminate x in (1) by Dividing both sides by 1.10.

$$(1.10x + 0.98y)/1.10 = 84.40/1.10$$

$$x + 0.8909y$$

$$x + 0.8909y = 76.73$$

Equation 2

$$1.15x + 1.14y = 91.7$$

Eliminate x in (2) by Dividing both sides by 1.15

$$(1.15x + 1.14y)/1.15 = 91.70/1.15$$

$$x + 0.9913y$$

$$x + 0.9913y = 79.74$$

$$0.1004y = 3.01$$

$$y = 3.01/0.1004$$

$$1.10x + 0.98y$$

$$1.10x + 0.98y = 84.40$$

Result:

$$1.10x + 0.98(29.98) = 84.40$$

Solve:

$$1.10x + 29.38 = 84.40$$

$$1.10x$$

$$1.10x = 84.40 - 29.38$$

BEP in Rs

$$\text{BEP in Rs} = \text{Fixed Costs} \times \text{Net Sales}$$

BEP in Rs

$$\text{BEP in Rs} = \text{Fixed costs} \times \text{Selling Price per unit}$$

BEP as % of capacity

$$\text{BEP as \% of capacity} = \text{BEP in units} \times 100 \%$$

$$\text{Contribution Margin per unit} = \text{CM} = S - VC$$

$$\text{Contribution Rate} = \text{CR} = \text{CM}/S \times 100\%$$

*Break Even Point (BEP):

$$\dots \text{in Units (x): } \text{Rs. } x = (\text{FC} / \text{CM})$$

$$\dots \text{in Sales Rs. : } \text{Rs. } x$$

$$\dots \text{in Sales Rs. : } \text{Rs. } x = (\text{FC} / \text{CM}) * S$$

Break Even Point:

$$\text{In Units, } x = \text{FC} / \text{CM} = 8640/20 = 432 \text{ Units}$$

$$\text{In Rs, } x = (\text{FC} / \text{CM}) * S =$$

$$(\text{Rs. } 8640/\text{Rs. } 20) * \text{Rs. } 50 = \text{Rs. } 21,600$$

% of Capacity

$$\% \text{ of Capacity} = \text{BEP in units} / \text{PC} \times 100\%$$

$$= 432 / 900 \times 100\%$$

Break Even Point

$$\dots \text{in units} = \text{FC} / \text{CM}$$

BEP in units

$$\text{BEP in units} = 3136 / 28 = 112 \text{ Units}$$

Break Even Point

$$\dots \text{in Rupees} = (\text{FC} / \text{CM}) \times S$$

$$= (3136 / 28) \times 185 = 20720 \text{ Rs.}$$

$$= 112 / 320 \times 100\%$$

BEP in units = FC/CM

$$= \text{Rs. } 2688 / \text{Rs. } 28$$

Step 3... Find % of Capacity

$$\text{BEP as a \% of capacity} = \text{BEP in units} / \text{PC} \times 100\%$$

$$= 96 / 320 \times 100\%$$

BEP in units = FC/CM

$$= \text{Rs. } 4588 / \text{Rs. } 37$$

BEP as a % of capacity = BEP in units / PC × 100%

$$= 124 / 320 \times 100\%$$

BEP in units = FC/CM

$$= \text{Rs. } 3136 / \text{Rs. } 14$$

BEP as a % of capacity = BEP in units / PC × 100%

$$= 224 / 320 \times 100\%$$

BEP in units = FC/CM

$$= \text{Rs. } 3136 / \text{Rs. } 28$$

Hence:

Company had a net income (NI) of $22 \times \text{Rs. } 28 = \text{Rs. } 616$

$$S = 185 \text{ Rs per unit}$$

$$VC = -157 \text{ Rs per unit}$$

$$\text{Number of units above BEP} = NI / CM$$

$$= \text{Rs. } 2000 / \text{Rs. } 28$$

$$S = 185 \text{ Rs per unit}$$

$$VC = -157 \text{ Rs per unit}$$

$$= 112 - 12 = 100$$

$$\text{Number of units sale above BEP in units}$$

$$\text{Number of units sale above BEP in units} = - \text{Net loss} \text{-----}$$

$$= - 336 / 28 = -12$$

$$= 112 + (-12) = 100$$

$$\text{Step 3... Find units over BEP}$$

$$\text{Units produced} = 320 * 0.85 = 272 \text{ Units}$$

Hence:

$$\text{Net income} = NI = 160 \text{ Units} * 28 = 4480 \text{ Rs.}$$

For example, the mean of 4, 8, and 9 is

$$(4 + 8 + 9) / 3 = 7$$

$$\text{Sum} = 596$$

$$\text{Mean} = 596 / 8 = 74.5$$

$$\text{Range} = \text{Maximum value} - \text{Minimum Value}$$

$$\text{Thus, Range} = 58 - 12 = 46$$

$$\text{Step 6: Compute Class Midpoints}$$

$$\text{Class Midpoint} = (\text{Lower limit} + \text{Upper limit})$$

$$\text{First midpoint is } (10+19)/2$$

$$\text{First midpoint is } (10+19)/2 = 14.5$$

Other midpoints are:

$$(20+29)/2 = 24.5$$

$$(30+39)/2$$

$$(30+39)/2 = 34.5$$

$$(40+49)/2$$

$$(40+49)/2 = 44.5$$

$$(50+59)/2$$

$$(50+59)/2 = 54.5$$

There are 3 observations in first class interval 10 – 19.

The relative frequency is $3/20 = 0.15$.

$$10 - 19 : 3$$

$$20 - 29 : 3 + 6 = 9$$

$$30 - 39 : 3 + 6 + 5$$

$$30 - 39 : 3 + 6 + 5 = 14$$

$$40 - 49 : 3 + 6 + 5 + 4$$

$$40 - 49 : 3 + 6 + 5 + 4 = 18$$

$$50 - 59 : 3 + 6 + 5 + 4 + 2$$

$$50 - 59 : 3 + 6 + 5 + 4 + 2 = 20$$

$$10 - 19 : 15$$

$$20 - 29 : 15 + 30 = 45$$

$$30 - 40 : 15 + 30 + 25$$

$$30 - 40 : 15 + 30 + 25 = 70$$

$$40 - 50 : 15 + 30 + 25 + 20$$

$$40 - 50 : 15 + 30 + 25 + 20 = 90$$

$$50 - 60 : 15 + 30 + 25 + 20 + 10$$

$$50 - 60 : 15 + 30 + 25 + 20 + 10 = 100$$

the formula

the formula =ROUND(H61/D61,0).

limits) Type the formula

limits) Type the formula =FREQUENCY(A3:A1,B3:B5) Then,
CTRL+Shift+Enter

is as under:

$$G = (x_1 \cdot x_2 \cdot x_3 \cdot \dots \cdot x_n)^{1/n}$$

Find GM of 130, 140, 160

$$GM = (130 \cdot 140 \cdot 160)^{1/3}$$

Syntax

$$1^{\text{st}} \text{ Quartile } Q_1 = (n+1)/4$$

2nd Quartile Q_2

$$2^{\text{nd}} \text{ Quartile } Q_2 = 2(n+1)/4$$

3rd Quartile Q_3

$$3^{\text{rd}} \text{ Quartile } Q_3 = 3(n+1)/4$$

Grouped data

$$Q_i = \text{ith Quartile} = l + h/f[\text{Sum } f/4^*i - cf]$$

Syntax

$$1^{\text{st}} \text{ Decile } D_1 = (n+1)/10$$

2nd Decile D_2

$$2^{\text{nd}} \text{ Decile } D_2 = 2(n+1)/10$$

9th Deciled D_9

$$9^{\text{th}} \text{ Deciled } D_9 = 9(n+1)/10$$

Grouped data

$$Q_i = \text{ith Decile } (i=1, 2, \dots, 9) = l + h/f[\text{Sum } f/10^*i - cf]$$

Syntax

$$1^{\text{st}} \text{ Percentile } P_1 = (n+1)/100$$

2nd Decile D_2

$$2^{\text{nd}} \text{ Decile } D_2 = 2(n+1)/100$$

99th Deciled D_9

$$99^{\text{th}} \text{ Deciled } D_9 = 99(n+1)/100$$

Grouped data

$$Q_i = \text{ith Decile } (i=1, 2, \dots, 9) = l + h/f[\text{Sum } f/100^*i - cf]$$

mode = 15, mean = 18, median = ?

$$\text{Median} = 1/3[\text{mode} + 2 \text{ mean}]$$

$$= 1/3[15 + 2(18)]$$

Q1

$$Q1 = 2\text{nd value} + 0.5 \times (3\text{rd value} - 2\text{nd value})$$

$$= 12 + 0.5 \times (13 - 12)$$

$$= 12 + 0.5 \times 1$$

So, Q3

$$\text{So, } Q3 = 7\text{th value} + 0.5 \times (8\text{th value} - 7\text{th value})$$

$$= 18 + 0.5 \times (21 - 18)$$

$$= 18 + 0.5 \times 3$$

Midhinge is the average of the first and third quartiles.

$$\text{Midhinge} = Q1 + Q3$$

So Q1

$$\text{So } Q1 = 2\text{nd value} + 0.75 \times (3\text{rd value} - 2\text{nd value})$$

$$= 8 + 0.75 \times (9 - 8)$$

$$= 8 + 0.75 \times 1$$

$$\text{Position of } Q3 = 3 \times (10 + 1) / 4 = 3 \times (2.75) = 8.25$$

$$\text{So } Q3 = 8\text{th value} + 0.25(9\text{th value} - 8\text{th value})$$

$$= 20 + 0.25 \times (22 - 20)$$

Mean

$$\text{Mean} = 360/9 = 40 \text{ marks}$$

$$= 40/9 = 4.4 \text{ marks}$$

$$= 39/9 = 4.3 \text{ marks}$$

Cell F73: S_x (

$$\text{Cell F73: } S_x (=SQRT(C72/5-F72*F72))$$

Cell G73: S_y

$$\text{Cell G73: } S_y = (\text{SQRT}(D72/5 - G72 * G72))$$

Cell H73: $\text{Cov}(x,y)$ (

$$\text{Cell H73: } \text{Cov}(x,y) (=E72/5 - F72 * G72)$$

Cell H74: Correlation coefficient (

$$\text{Cell H74: Correlation coefficient } (=H73/(F73 * G73))$$

Y

$$Y = a + bX.$$

Y_i

$$Y_i = a + bX_i + e_i$$

$$= 102/9 = 11.33$$

$$= 302/9 = 33.56$$

P-value

$$P\text{-value} = 0.000133.$$

$$= 16452/7 = 2350.29$$

$$= 35913/7 = 5130.429$$

$$\text{Drop } 170; \text{ Add } 176; = (176 - 170)/3 = 6/3 = 2$$

$$\text{Last average} + 2 = 180 + 2 = 182$$

Day 1, Afternoon

$$\text{Actual} - \text{Trend} = 140 - 180 = -40$$

Actual value = 140

$$\text{Random variation} = 140 - 144 = -4$$

Trend = 180 to 195 (6 intervals)

$$= 15/6 = 2.5 \text{ per period}$$

Seasonal variation as already worked out

$$\text{Seasonal variation as already worked out} = -8$$

Please refer to the Example discussed in Handout 33.

$$\text{Let } = 0.3$$

Then:

$$F(t) = F(t-1) + (A(t-1) - F(t-1))$$

$$= A(t-1) + (1 -) F(t-1)$$

$F(t-1)$

$$F(t-1) = A(t-2) + (1 -) F(t-2)$$

Substituting

$$F_3 = A(t-1) + (1 -) [A(t-2) + (1 -) F(t-2)]$$

$$= [A(t-1) + (1 -) A(t-2)] + (1 -)^2 F(t-2)$$

In general

$$n! = n(n-1)(n-2) \dots 3 \cdot 2 \cdot 1 \text{ or}$$

$n!$

$$n! = n(n-1)(n-2)!$$

Number of permutations of n objects taken r at a time =

$${}_nP_r = n! / (n-r)!$$

Formula

$${}_nP_r = n! / n_1! n_2! \dots n_k!$$

${}_nC_r$

$${}_nC_r = n! / r!(n-r)!$$

e.g., ${}_4C_0 = {}_4C_4 = 1$

$${}_nC_1 = {}_nC_{n-1} = n$$

We can verify that:

$$(x+y)^1 = x + y$$

$(x+y)^2$

$$(x+y)^2 = x^2 + 2xy + y^2$$

$(x+y)^3$

$$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$(x+y)^4$

$$(x+y)^4 = x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

written in combinatorial notation:

$$(x+y)^5 = {}^5C_0 \cdot x^5 + {}^5C_1 x^4 y + {}^5C_2 x^3 y^2 + {}^5C_3 x^2 y^3 + {}^5C_4 x y^4 + {}^5C_5 y^5$$

Solving:

$$= x^5 + 5x^4 y + 10x^3 y^2 + 10x^2 y^3 + 5x y^4 + y^5$$

First term = x^5

Last term = y^5

Second coefficient = $5/1 = 5$

Third coefficient = $5 \cdot 4/2 = 10$

Fourth coefficient

Fourth coefficient = $10 \cdot 3/3 = 10$

Fifth coefficient

Fifth coefficient = $10 \cdot 2/4 = 5$

occurring

occurring = $p(\text{Rashid}) = 1/600$

$p(\text{woman})$

$p(\text{woman}) = 250/600$

When A and B are mutually exclusive:

$$p(A \text{ or } B) = p(A) + p(B)$$

divisible by three?

$p(\text{even}) = 3/6$

$p(\text{div by } 3)$

$p(\text{div by } 3) = 2/6$

Solution

$p(\text{woman chosen}) = 2/5$

Probabilities of all these events together add up to 1.

$$p(A) + p(B) + p(C) + \dots + p(N) = 1$$

$p(A) + p(B) + p(C)$

$$p(A) + p(B) + p(C) = 1$$

$$p(\text{1st working}) = 1 - p(\text{1st not working}) = 1 - 1/10 = 9/10$$

$$p(\text{2nd working}) = 19/20$$

$$p(\text{3rd working})$$

$$p(\text{3rd working}) = 39/40$$

$$p(\text{all working}) = 9/10 \times 19/20 \times 39/40$$

$$p(\text{all working}) = 9/10 \times 19/20 \times 39/40 = 6669/8000$$

$$p(\text{caught only on second occasion})$$

$$p(\text{caught only on second occasion}) = \frac{3}{4} \times \frac{1}{4} \times \frac{3}{4} = 9/64$$

$$p(\text{caught}) =$$

$$p(\text{dismissed 1}) + p(\text{dismissed 2}) + p(\text{dismissed 3}) = 4/64 + 3/64 + 3/64$$

$$p(\text{not caught}) = 1 - p(\text{caught})$$

$$= 1 - 10/64$$

by three?

$$P(\text{odd}) = 3/6$$

60% workforce are men.

$$p(\text{man chosen}) = 3/5$$

not being caught was $1 - 1/4$

not being caught was $1 - 1/4 = 3/4$.

Now the probabilities can be calculated as follows:

$$1C \& 2C (1/4 \times 1/4 = 1/16)$$

$$1C \& 2NC \& 3C (1/4 \times 3/4 \times 1/4)$$

$$1C \& 2NC \& 3C (1/4 \times 3/4 \times 1/4 = 3/64)$$

$$1C \& 2NC \& 3NC (1/4 \times 3/4 \times 3/4)$$

$$1C \& 2NC \& 3NC (1/4 \times 3/4 \times 3/4 = 9/64)$$

$$1NC \& 2C \& 3C (3/4 \times 1/4 \times 1/4)$$

$$1NC \& 2C \& 3C (3/4 \times 1/4 \times 1/4 = 3/64)$$

$$1NC \& 2C \& 3NC (3/4 \times 1/4 \times 3/4)$$

$$1NC \& 2C \& 3NC (3/4 \times 1/4 \times 3/4 = 9/64)$$

$$1NC \& 2NC \& 3C \left(\frac{3}{4} \times \frac{3}{4} \times \frac{1}{4} \right)$$

$$1NC \& 2NC \& 3C \left(\frac{3}{4} \times \frac{3}{4} \times \frac{1}{4} = \frac{9}{64} \right)$$

$$1NC \& 2NC \& 3NC \left(\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} \right)$$

$$1NC \& 2NC \& 3NC \left(\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{27}{64} \right)$$

First Caught, Second Caught, Dismissed:

$$1C \left(\frac{1}{4} \right) \& 2C \left(\frac{1}{4} \right) \text{ (Dismissed 1)} \left(\frac{1}{16} = \frac{4}{64} \right)$$

$p(\text{not caught})$

$$= 1 - p(\text{caught})$$

Solution:

$$P(A \text{ gets first or } A \text{ gets second}) = \frac{3}{4} + \frac{3}{4} = \frac{6}{4}$$

Split "A gets first or the second or both" into 3 parts

$$A \text{ gets first but not second} = \frac{3}{4} \times \frac{1}{4} = \frac{3}{16}$$

A does not get first but gets second

$$A \text{ does not get first but gets second} = \frac{1}{4} \times \frac{3}{4} = \frac{3}{16}$$

A gets both

$$A \text{ gets both} = \frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$$

$$\text{Management female} = 0.25 \times 40 = 10$$

$$\text{Non-Management female} = 40 - 10 = 30$$

$$\text{Management male} = 0.3 \times 60 = 18$$

$$\text{Non-Management male} = 60 - 18 = 42$$

Management total

$$\text{Management total} = 18 + 10 = 28$$

Non-Management total

$$\text{Non-Management total} = 42 + 30 = 72$$

Total 100 203000

$$\text{Mean/day} = 203000/100 = 2030$$

Applying the formula above:

$$EMV = 0.8 \times 0 + 0.15 \times 5000 + 0.05 \times 50000$$

$$= 0 + 750 + 2500$$

$$= 1/20 = 0.05).$$

$$b(x < 2; 5, 0.3)$$

$$b(x < 2; 5, 0.3) = 0.837$$

$$= 1 - 0.3995$$

$$b^*(x; r, P)$$

$$b^*(x; r, P) = {}^{x-1}C_{r-1} * P^r * (1-P)^{x-r}$$

$$b^*(x; r, P)$$

$$b^*(x; r, P) = {}^{x-1}C_{r-1} * P^r * Q^{x-r}$$

$$b^*(5; 1, 0.7)$$

$$b^*(5; 1, 0.7) = {}^4C_0 * 0.7^1 * 0.3^4$$

$$b^*(5; 3, 0.7)$$

$$b^*(5; 3, 0.7) = 0.00567$$

$$= 1/20 \times (100 - 10) + 19/20 \times (-10) \text{ Rs.}$$

$$= 90/20 - 190/20 \text{ Rs.}$$

$$= 20 + 60 + 75 + 60 + 45 + 30$$

$$= 1 - [0.0064 + 0.0223 + 0.0521 + 0.0912 + 0.1277 + 0.149 + 0.149 + 0.1304]$$

Solution

$$= 8/2 = 4$$

Solution

$$m = 1 \times 500/100 = 5$$

with mean P%

$$\text{and standard deviation (STEP)} = [P(100-P)/n]^{1/2} \%$$

Solution:

$$\text{standard deviation (STEP)} = [P(100-P)/n]^{(1/2)} \%$$

$$\text{STEP} = [25(100 - 25)/80]^{(1/2)} \%$$

$$= [(25 \times 75)/80]^{(1/2)} \%$$

$$\% \text{ women in sample} = (25/80) \times 100 \% = 31.25\%$$

$$z = (31.25 - 25)/4.84$$

$$0.5 - 0.025$$

$$0.5 - 0.025 = 0.475$$

Range

$$\text{Range} = 20 \pm 2 \times \text{STEP}$$

$$= 20 \pm 2 \times [(20 \times (100 - 20))/60]^{1/2}$$

For 99% confidence limits:

$$z\text{-value} = 2.58.$$

$$0.5 - 0.005$$

$$0.5 - 0.005 = 0.495$$

$$\text{STEM} = 15/(64)^{1/2} = 15/(64)^{1/2} = 15/8 = 1.875$$

$$z = 100 - 95 / \text{STEM}$$

95% confidence interval

$$95\% \text{ confidence interval} = 225 \pm 2 \times 0.5 \text{ or From } 224 \text{ to } 226 \text{ g}$$

STEP

$$= [P(100 - P)/n]^{1/2}$$

$$\text{STEP} = [5(100 - 5)/400]^{1/2}$$

$$= [5 \times 95/400]^{1/2}$$

Range at 95 % Confidence Limits

$$= 5 \pm 2 \times 1.09$$

$z = 1.64$ for 5% significance level

$$\text{Range} = P - 1.64 \times \text{STEP} (0.98\%)$$

$z = 1.96$ for 5% significance level

$$\text{Range} = P \pm 1.96 \times \text{STEP} (0.98\%)$$

With

$$\text{StDev} = \text{STEM} = \text{population s.d.}/(n)^{1/2}$$

Is there a difference in wages between workers?

$$\text{Difference of two sample means} = s[(1/n_1) + (1/n_2)]^{1/2}$$

s

$$s = [(n_1 \cdot s_1^2 + n_2 \cdot s_2^2) / (n_1 + n_2)]^{1/2}$$

$$(O-E)^2/E: 0.643 \ 0.0625 \ 1.6 \ 1.286 \ 0.12$$

$$(O-E)^2/E: 0.643 \ 0.0625 \ 1.6 \ 1.286 \ 0.125 \ 3.2 = 6.92$$

df

$$df = (r - 1)(c - 1).$$

THE FORMAT FOR AN LP MODEL

Maximize or minimize $c_j x_j = c_1 x_1 + c_2 x_2 + \dots + c_n x_n$

Subject to

$$a_{ij} x_j < b_i, \ i = 1, \dots, m$$

Non-negativity conditions: all $x_j > 0, j$

Non-negativity conditions: all $x_j > 0, j = 1, \dots, n$

$X_1 - X_2 \leq 350$ (Mix)

$x_j \geq 0, j = 1, 2$ (Nonnegativity)

Good Luck!

Keep practicing!