

Back Savers Company

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```
BSC<-matrix(c(3,45,"$32",2,40,"$24"),ncol=3,byrow=TRUE)
colnames(BSC)<-c("Material","Labor","Profit")
rownames(BSC)<-c('COLLEGIATE','MINI')
BSC_table=as.table(BSC)
print(BSC_table)
```

```
##           Material Labor Profit
## COLLEGIATE 3         45   $32
## MINI       2         40   $24
```

for _instance_1.1,

Num_of_Collegiate

$$= x_c l$$

Num_ofmini

$$= x_m l$$

1.1) Decision_variable:

$$= x_c l, x_m l$$

1.2) objective_function:

maximized_profits

$$Max \ Z = 32x_c l + 24x_m l$$

1.3) Constraints:

labour_constraint:

$$45x_c l + 40x_m l \leq 60(40)$$

material_constraint:

$$3x_c l + 2x_m l \leq 5000$$

sales Constraint:

$$x_c l \leq 1000$$

$$x_m l \leq 1200$$

1.4) Mathematical_equation:

maximized_profits

$$Max \ Z = 32x_c l + 24x_m l$$

Subject to the constraints:

Labour_constraint:

$$45x_c l + 40x_m l \leq 60(40)$$

material_constraint:

$$3x_cl + 2x_ml \leq 5000$$

Sale_constraint:

$$x_C \leq 1000$$

$$x_M \leq 1200$$

Non-negativity of the decision_variables:

$$x_cl \geq 0, x_ml \geq 0$$

Weigelt Corporation

for_instance_1.2,

Function

$$= X_{ij}$$

where,

size (L,M,S)

$$=_i$$

plant (1,2,3)

$$=_j$$

No_of_large_units_at_plant_1

$$= X_{L1}$$

No_of_medium_units_at_plant_1

$$= X_{M1}$$

No_of_small_units_at_plant_1

$$= X_{S1}$$

No_of_large_units_at_plant_2

$$= X_{L2}$$

No_of_medium_units_at_plant_2

$$= X_{M2}$$

No_of_small_units_at_plant_2

$$= X_{S2}$$

No_of_large_units_at_plant_3

$$= X_{L3}$$

No_of_medium_units_at_plant_3

$$= X_{M3}$$

No_of_small_units_at_plant_3

$$= X_{S3}$$

1.1) Decision_variables:

$$X_{L1}, X_{M1}, X_{S1}$$

$$X_{L2}, X_{M2}, X_{S2}$$

$$X_{L3}, X_{M3}, X_{S3}$$

1.2) Linear Programming model:

maximized_profits

$$\text{Max } Z = 420(X_{L1} + X_{L2} + X_{L3}) + 360(X_{M1} + X_{M2} + X_{M3}) + 300(X_{S1} + X_{S2} + X_{S3})$$

Subject to the constraints:

capacity_constraint:

$$X_{L1} + X_{M1} + X_{S1} \leq 750$$

$$X_{L2} + X_{M2} + X_{S2} \leq 900$$

$$X_{L3} + X_{M3} + X_{S3} \leq 450$$

storage_constraint:

$$20X_{L1} + 15X_{M1} + 12X_{S1} \leq 13000$$

$$20X_{L2} + 15X_{M2} + 12X_{S2} \leq 1200$$

$$20X_{L3} + 15X_{M3} + 12X_{S3} \leq 5000$$

sales_constraint:

$$X_{L1} + X_{M1} + X_{S1} \leq 750$$

$$X_{L2} + X_{M2} + X_{S2} \leq 900$$

$$X_{L3} + X_{M3} + X_{S3} \leq 450$$

Non-negativity of the decision_variables:

$$X_{L1} \geq 0, X_{M1} \geq 0, X_{S1} \geq 0, X_{L2} \geq 0, X_{M2} \geq 0, X_{S2} \geq 0, X_{L3} \geq 0, X_{M3} \geq 0, X_{S3} \geq 0$$