

SOLUTION PROBLEM C

```
set      BEER                                     ; # Beer Brands

param Cpg      {i in BEER}                       ; # Cost per Gallon per Beer brand
param Spr      {i in BEER}                       ; # Selling Price per Gallon per Beer brand
param Dmd      {i in BEER}                       ; # Demand in Gallons per Beer brand
param Bdg      ;                                ; # Budget for beer
param Cap      ;                                ; # Storage Capacity

var      QB      {i in BEER} integer >= 0        ; # Quantity Bought per Beer Brand

maximize TotPrf      : sum {i in BEER} QB[i] * (Spr[i] - Cpg[i]) ; # Maximize Total Profit

s.t. BdgCon      : sum {i in BEER} (QB[i] * Cpg[i]) <= Bdg ; # Budget Constraint
s.t. CapCon      : sum {i in BEER} QB[i] <= Cap ; # Storage Capacity Constraint
s.t. DmdCon      : QB[i] <= Dmd[i] ; # Demand Constraint

data                                           ;

set      BEER      :=      Yodel Shotz Rainw ;

param      :      Cpg      Spr      Dmd      :=
Yodel      1.50      3.00      400
Shotz      0.90      2.50      500
Rainw      0.50      1.75      300      ;

param Bdg      := 2000      ;
param Cap      := 1000      ;

option solver gurobi      ;
solve      ;
option display_width 200, display_1col 0      ;

display QB      ;
```

SOLUTION PROBLEM Ea

```

param T                                     ; # Number of Periods (Months)

param Dmd {1..T}                           ; # Monthly Demand of the Component
param Scp {1..T}                           ; # Supplier Capacity per month
param Ppr                                   ; # Price per unit
param Ivc                                   ; # Monthly Inventory cost per unit
param Ivi                                   ; # Initial Inventory (t=0)
param Ivf                                   ; # Final Inventory (t=T)

var QP {1..T} integer >= 0                 ; # Quantity Purchased per month
var IV {1..T} integer >= 0                 ; # Inventory per month

minimize TotCst : Ppr * sum {t in 1..T} QP[t] + Ivc * sum {t in 1..T} IV[t]; # Minimize Total Cost

s.t. ScpCon {t in 1..T} : QP[t] <= Scp[t] ; # Can't buy more than the supplier's capacity
s.t. IviCon : IV[1] = Ivi + QP[1] - Dmd[1] ; # Initial Inventory
s.t. Ivt {t in 2..T} : IV[t] = IV[t-1] + QP[t] - Dmd[t] ; # Inventory
s.t. IvfCon : IV[T] >= Ivf ; # Required minimum final inventory

data ;

param T := 6 ;

param : Dmd Scp :=
1 270 650
2 480 650
3 520 650
4 540 500
5 660 650
6 770 650 ;

param Ppr := 10 ;
param Ivc := 3 ;
param Ivi := 150 ;
param Ivf := 100 ;

option solver gurobi ;
solve ;
option display_width 200, display_1col 0 ;
display QP,IV ;

```

SOLUTION PROBLEM Eb

```

set      SUPP
param    T

param    Dmd      {1..T}
param    Scp      {1..T, j in SUPP}
param    Ppr      {j in SUPP}
param    Ivc
param    Ivi
param    Ivf

var      QP      {1..T, j in SUPP} integer >= 0
var      IV      {1..T} integer >= 0

minimize TotCst : sum {t in 1..T, j in SUPP} (Ppr[j] * QP[t,j]) +
                Ivc * sum {t in 1..T} IV[t]

s.t.     ScpCon   {t in 1..T, j in SUPP} : QP[t,j] <= Scp[t,j]
s.t.     IviCon   : IV[1] = Ivi + sum{j in SUPP} QP[1,j] - Dmd[1]
s.t.     Ivt      {t in 2..T} : IV[t] = IV[t-1] + sum{j in SUPP} QP[t,j] - Dmd[t]
s.t.     IvfCon   : IV[T] >= Ivf

data
;

set      SUPP      :=      S1      S2      ;
param    T          :=      6          ;

param    Scp      :      S1      S2      :=
1      650      0
2      650      0
3      650      200
4      500      0
5      650      0
6      650      0      ;

param      :      Dmd      :=
1      270
2      480
3      520
4      540
5      660
6      770      ;

```

```

; # Suppliers
; # Number of Periods (Months)

; # Monthly Demand of the Component
; # Supplier Capacity per month
; # Price per unit
; # Monthly Inventory cost per unit
; # Initial Inventory (t=0)
; # Final Inventory (t=T)

; # Quantity Purchased per month
; # Inventory per month

; # Minimize Total Cost

; # QP limited by supplier's capacity
; # Initial Inventory
; # Inventory
; # Required minimum final inventory

```

```
param Ppr    :=    S1    10    S2    12.50 ;
param Ivc    :=        3                ;
param Ivi    :=    150                ;
param Ivf    :=    100                ;
```

```
option solver gurobi                ;
solve                                ;
option display_width 200, display_1col 0 ;

display QP,IV                        ;
```