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Take home Problem from final
variables: daysPLiPCjPRkF for i,j,k=1,2, for February days of production in
plant i of product j by process k
unitsPLiPRjF for i,j,k=1,2, for February units of production in plant i of
product j
daysPLiPCjPRkM for i,j,k=1,2, for March days of production in plant i of
product j by process k
unitsPLiPRjM for i,j,k=1,2, for March units of production in plant i of product
j
PLiINVj for units of product j inventoried at plant i
PLiSOLDjF for units of product j sold locally at plant i in February
PLiSOLDjM for units of product j sold locally at plant i in March
SHiPRjF for units of product j shipped from plant i in February
SHiPRjM for units of product j shipped from plant i in March
> restart;
> with(simplex):
Warning, the protected names maximize and minimize have been redefined and
unprotected

> eq1:= daysPL1PC1PR1F+daysPL1PC1PR2F=20:
> eq2:= daysPL1PC2PR1F+daysPL1PC2PR2F=20:
> eq3:= daysPL2PC1PR1F+daysPL2PC1PR2F=20:
> eq4:= daysPL2PC2PR1F+daysPL2PC2PR2F=20:
> eq5:= unitsPL1PR1F=100*daysPL1PC1PR1F+140*daysPL1PC2PR1F:
> eq6:= unitsPL1PR2F=120*daysPL1PC1PR2F+150*daysPL1PC2PR2F:
> eq7:= unitsPL2PR1F=130*daysPL2PC1PR1F+110*daysPL2PC2PR1F:
> eq8:= unitsPL2PR2F=160*daysPL2PC1PR2F+130*daysPL2PC2PR2F:
> eq9:= PL1SOLD1F+PL1INV1+SH1PR1F=unitsPL1PR1F:
> eq9b:= PL1SOLD1F+SH2PR1F<=3600:
> eq10:= PL1SOLD2F+PL1INV2+SH1PR2F=unitsPL1PR2F:
> eq10b:= PL1SOLD2F+SH2PR2F<=4500:
> eq11:= PL2SOLD1F+PL2INV1+SH2PR1F=unitsPL2PR1F:
> eq11b:= PL2SOLD1F+SH1PR1F<=4900:
> eq12:= PL2SOLD2F+PL2INV2+SH2PR2F=unitsPL2PR2F:
> eq12b:= PL2SOLD2F+SH1PR2F<=5100:
> eq13:= RevenuePR1F=83*(PL1SOLD1F+PL2SOLD1F)+(83-9)*(SH1PR1F+SH2PR1F):
> eq14:=
CostPR1F=3*(PL1INV1+PL2INV1)+daysPL1PC1PR1F*100*62+daysPL1PC2PR1F*140*59+daysPL
2PC1PR1F*130*61+daysPL2PC2PR1F*110*65:
> eq15:= RevenuePR2F=112*(PL1SOLD2F+PL2SOLD2F)+(112-7)*(SH1PR2F+SH2PR2F):
> eq16:=
CostPR2F=4*(PL1INV2+PL2INV2)+daysPL1PC1PR2F*120*78+daysPL1PC2PR2F*150*85+daysPL
2PC1PR2F*160*89+daysPL2PC2PR2F*130*86:
> eq17:= profitF=RevenuePR1F+RevenuePR2F-CostPR1F-CostPR2F:
>
constraintsF:={eq1,eq2,eq3,eq4,eq5,eq6,eq7,eq8,eq9,eq10,eq11,eq12,eq13,eq14,eq1
5,eq16,eq17,eq9b,eq10b,eq11b,eq12b}:
> maximize(profitF,constraintsF,NONNEGATIVE);
/
{ daysPL2PC2PR2F = 20, PL1INV1 = 0, daysPL1PC1PR1F = 0, unitsPL1PR1F = 840,
\

          35                                125
daysPL2PC1PR1F = --, unitsPL2PR2F = 5100, daysPL2PC1PR2F = ---,
          8                                8

          2275                                2275
PL2SOLD1F = ----, unitsPL2PR1F = ----, daysPL1PC2PR1F = 6, SH2PR2F = 0,
          4                                4

PL1INV2 = 0, SH1PR2F = 0, PL2INV1 = 0, PL2INV2 = 0, SH1PR1F = 0,

SH2PR1F = 0, daysPL2PC2PR1F = 0, PL2SOLD2F = 5100, unitsPL1PR2F = 4500,

592145

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profitF = -----, daysPL1PC2PR2F = 14, PL1SOLD1F = 840, PL1SOLD2F = 4500,
          2

RevenuePR2F = 1075200, CostPR2F = 811800, RevenuePR1F = -----,
                                                    467705
                                                    4

CostPR1F = -----, daysPL1PC1PR2F = 20 }
          337015                               \
          4                                     /

>
> eq21:= daysPL1PC1PR1M+daysPL1PC1PR2M=23:
> eq22:= daysPL1PC2PR1M+daysPL1PC2PR2M=23:
> eq23:= daysPL2PC1PR1M+daysPL2PC1PR2M=23:
> eq24:= daysPL2PC2PR1M+daysPL2PC2PR2M=23:
> eq25:= unitsPL1PR1M=100*daysPL1PC1PR1M+140*daysPL1PC2PR1M:
> eq26:= unitsPL1PR2M=120*daysPL1PC1PR2M+150*daysPL1PC2PR2M:
> eq27:= unitsPL2PR1M=130*daysPL2PC1PR1M+110*daysPL2PC2PR1M:
> eq28:= unitsPL2PR2M=160*daysPL2PC1PR2M+130*daysPL2PC2PR2M:
> eq29:= PL1SOLD1M+SH1PR1M=unitsPL1PR1M+PL1INV1:
> eq29b:= PL1SOLD1M+SH2PR1M<=6300:
> eq30:= PL1SOLD2M+SH1PR2M=unitsPL1PR2M+PL1INV2:
> eq30b:= PL1SOLD2M+SH2PR2M<=5400:
> eq31:= PL2SOLD1M+SH2PR1M=unitsPL2PR1M+PL2INV1:
> eq31b:= PL2SOLD1M+SH1PR1M<=4200:
> eq32:= PL2SOLD2M+SH2PR2M=unitsPL2PR2M+PL2INV2:
> eq32b:= PL2SOLD2M+SH1PR2M<=6000:
> eq33:= RevenuePR1M=83*(PL1SOLD1M+PL2SOLD1M)+(83-9)*(SH1PR1M+SH2PR1M):
> eq34:=
CostPR1M=daysPL1PC1PR1M*100*62+daysPL1PC2PR1M*140*59+daysPL2PC1PR1M*130*61+days
PL2PC2PR1M*110*65:
> eq35:= RevenuePR2M=112*(PL1SOLD2M+PL2SOLD2M)+(112-7)*(SH1PR2M+SH2PR2M):
> eq36:=
CostPR2M=daysPL1PC1PR2M*120*78+daysPL1PC2PR2M*150*85+daysPL2PC1PR2M*160*89+days
PL2PC2PR2M*130*86:
> eq37:= profitM=RevenuePR1M+RevenuePR2M-CostPR1M-CostPR2M:
>
constraintsM:={eq21,eq22,eq23,eq24,eq25,eq26,eq27,eq28,eq29,eq30,eq31,eq32,eq33
,eq34,eq35,eq36,eq37,eq29b,eq30b,eq31b,eq32b}:
> profit:=profitF+profitM:
> maximize(profit,constraintsF union constraintsM,NONNEGATIVE);
/
{ daysPL1PC1PR2M = 23, daysPL2PC2PR2F = 20, daysPL1PC1PR1F = 0,
\

PL2SOLD2F = 5100, SH1PR1F = 0, SH1PR2M = 0, unitsPL1PR2F = 4500,

daysPL2PC2PR2M = 23, RevenuePR2F = 1075200, daysPL1PC1PR2F = 20,

daysPL1PC2PR1F = 6, unitsPL2PR1F = -----, daysPL2PC1PR1F = --,
          2275                               35
          4                                     8

PL2SOLD1F = -----, PL1SOLD1F = 840, profitM = -----, PL1SOLD1M = 756,
          2275                               1368841
          4                                     4

profitF = -----, RevenuePR1F = -----, RevenuePR1M = -----,
          592145                               467705                               863449
          2                                     4                                     8

CostPR1F = -----, daysPL2PC1PR2F = ----, daysPL1PC2PR2F = 14,
          337015                               125
          4                                     8

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unitsPL2PR2F = 5100, CostPR2F = 811800, CostPR1M =  $\frac{622487}{8}$ ,
CostPR2M = 964710, unitsPL1PR2M = 5400, PL1SOLD2M = 5400,
daysPL1PC2PR1M =  $\frac{27}{5}$ , daysPL2PC1PR2M =  $\frac{301}{16}$ , daysPL2PC1PR1M =  $\frac{67}{16}$ ,
daysPL2PC2PR1M = 0, SH2PR2F = 0, SH1PR1M = 0, SH2PR1M = 0,
unitsPL2PR1M =  $\frac{4355}{8}$ , PL2SOLD1M =  $\frac{4355}{8}$ , unitsPL2PR2M = 6000,
unitsPL1PR1F = 840, daysPL1PC2PR2M =  $\frac{88}{5}$ , unitsPL1PR1M = 756,
PL1SOLD2F = 4500, PL2SOLD2M = 6000, RevenuePR2M = 1276800, PL2INV2 = 0,
SH1PR2F = 0, PL2INV1 = 0, PL1INV2 = 0, PL1INV1 = 0, SH2PR1F = 0,
SH2PR2M = 0, daysPL2PC2PR1F = 0, daysPL1PC1PR1M = 0 }
> subs(% ,profit);
 $\frac{2553131}{4}$ 
> evalf(%);
6.382827500 10
>

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