```
/*********************************************
 * OPL 4.2 Model file
 * Author: alexis.vega
 * Creation date: 15/01/2010 19:05
 *********************************************/

int T =52;
int I =6;
int Q =4;
int J =4;
int NUM = 100000000;

range PERIODES = (-26)..T; //horitzó de planificació
range COMPONENTS = 1..I; //Components a comprar als proveïdors
range PRODUCTES = 1..Q; //Famílies de productes a produir
range PROVEIDORS = 1..J; //Proveïdors

range S=1..2; //conjunt de proveïdors amb descompte per volum de negoci

range S2=3..4; //conjunt de proveïdors amb descompte per quantitat total component i

{int} k[PROVEIDORS]=[{1,2,4,6},{2,3,5,6},{1,3,4,5},{1,2,3,4,5,6}]; // conjunt components oferts pel
proveïdor j

/*DESCOMPTES*/

int R =5;
range DESCOMPTES = 0..R; //intervals de descompte
int b[PERIODES][PROVEIDORS][DESCOMPTES]; //límit superior de descompte r per volum de negoci
execute{
   for(var t in PERIODES){
            b[t][1][0] = 0;
            b[t][1][1] = 89910;
            b[t][1][2] = 134866;
            b[t][1][3] = 179821;
            b[t][1][4] = 3596374;
            b[t][1][5] = 899108;

            b[t][2][0] = 0;
            b[t][2][1] = 57344;
            b[t][2][2] = 86016;
            b[t][2][3] = 114688;
            b[t][2][4] = 229376;
            b[t][2][5] = 573440;
   }
}

int bb[PERIODES][PROVEIDORS][COMPONENTS][DESCOMPTES]; //límit superior de descompte r per
quantitat total component i
execute{
   for(var t in PERIODES){
```

```
bb[t][3][1][0] = 0;
bb[t][3][1][1] = 35771;
bb[t][3][1][2] = 53656;
bb[t][3][1][3] = 89427;
bb[t][3][1][4] = 143084;
bb[t][3][1][5] = 357710;

bb[t][3][3][0] = 0;
bb[t][3][3][1] = 4114;
bb[t][3][3][2] = 6171;
bb[t][3][3][3] = 10286;
bb[t][3][3][4] = 16457;
bb[t][3][3][5] = 41142;

bb[t][3][4][0] = 0;
bb[t][3][4][1] = 4550;
bb[t][3][4][2] = 6826;
bb[t][3][4][3] = 11376;
bb[t][3][4][4] = 18201;
bb[t][3][4][5] = 45504;

bb[t][3][5][0] = 0;
bb[t][3][5][1] = 3921;
bb[t][3][5][2] = 5882;
bb[t][3][5][3] = 11376;
bb[t][3][5][4] = 18201;
bb[t][3][5][5] = 39213;

bb[t][4][1][0] = 0;
bb[t][4][1][1] = 28056;
bb[t][4][1][2] = 42084;
bb[t][4][1][3] = 70139;
bb[t][4][1][4] = 112223;
bb[t][4][1][5] = 280557;

bb[t][4][2][0] = 0;
bb[t][4][2][1] = 28056;
bb[t][4][2][2] = 42084;
bb[t][4][2][3] = 70139;
bb[t][4][2][4] = 112223;
bb[t][4][2][5] = 280557;
bb[t][4][3][0] = 0;
bb[t][4][3][1] = 3457;
bb[t][4][3][2] = 5186;
bb[t][4][3][3] = 8643;
bb[t][4][3][4] = 13829;
bb[t][4][3][5] = 34573;

bb[t][4][4][0] = 0;
bb[t][4][4][1] = 3432;
bb[t][4][4][2] = 5147;
```

```
            bb[t][4][4][3] = 8579;
            bb[t][4][4][4] = 13727;
            bb[t][4][4][5] = 34317;

            bb[t][4][5][0] = 0;
            bb[t][4][5][1] = 3295;
            bb[t][4][5][2] = 4943;
            bb[t][4][5][3] = 8238;
            bb[t][4][5][4] = 13181;
            bb[t][4][5][5] = 32952;

            bb[t][4][6][0] = 0;
            bb[t][4][6][1] = 2068;
            bb[t][4][6][2] = 3102;
            bb[t][4][6][3] = 5169;
            bb[t][4][6][4] = 8271;
            bb[t][4][6][5] = 20678;
   }
}
float d[PERIODES][PROVEIDORS][DESCOMPTES]; //coeficient de descompte r per volum de negoci
execute{
   for(var t in PERIODES){
      d[t][1][0]=0;
      d[t][1][1]=0;
      d[t][1][2]=0.05;
      d[t][1][3]=0.07;
      d[t][1][4]=0.12;
      d[t][1][5]=0.25;

      d[t][2][0]=0;
      d[t][2][1]=0;
      d[t][2][2]=0.05;
      d[t][2][3]=0.07;
      d[t][2][4]=0.12;
      d[t][2][5]=0.25;

   }
}
float dd[PERIODES][PROVEIDORS][COMPONENTS][DESCOMPTES]; //coeficient de descompte r per
quantitat total component i
execute{
   for(var t in PERIODES){

            dd[t][3][1][0] = 0;
            dd[t][3][1][1] = 0;
            dd[t][3][1][2] = 0.05;
            dd[t][3][1][3] = 0.07;
            dd[t][3][1][4] = 0.12;
            dd[t][3][1][5] = 0.25;

            dd[t][3][3][0] = 0;
```

```
dd[t][3][3][1] = 0;
dd[t][3][3][2] = 0.05;
dd[t][3][3][3] = 0.07;
dd[t][3][3][4] = 0.12;
dd[t][3][3][5] = 0.25;

dd[t][3][4][0] = 0;
dd[t][3][4][1] = 0;
dd[t][3][4][2] = 0.05;
dd[t][3][4][3] = 0.07;
dd[t][3][4][4] = 0.12;
dd[t][3][4][5] = 0.25;

dd[t][3][5][0] = 0;
dd[t][3][5][1] = 0;
dd[t][3][5][2] = 0.05;
dd[t][3][5][3] = 0.07;
dd[t][3][5][4] = 0.12;
dd[t][3][5][5] = 0.25;

dd[t][4][1][0] = 0;
dd[t][4][1][1] = 0;
dd[t][4][1][2] = 0.05;
dd[t][4][1][3] = 0.07;
dd[t][4][1][4] = 0.12;
dd[t][4][1][5] = 0.25;

dd[t][4][2][0] = 0;
dd[t][4][2][1] = 0;
dd[t][4][2][2] = 0.05;
dd[t][4][2][3] = 0.07;
dd[t][4][2][4] = 0.12;
dd[t][4][2][5] = 0.25;

dd[t][4][3][0] = 0;
dd[t][4][3][1] = 0;
dd[t][4][3][2] = 0.05;
dd[t][4][3][3] = 0.07;
dd[t][4][3][4] = 0.12;
dd[t][4][3][5] = 0.25;

dd[t][4][4][0] = 0;
dd[t][4][4][1] = 0;
dd[t][4][4][2] = 0.05;
dd[t][4][4][3] = 0.07;
dd[t][4][4][4] = 0.12;
dd[t][4][4][5] = 0.25;

dd[t][4][5][0] = 0;
dd[t][4][5][1] = 0;
dd[t][4][5][2] = 0.05;
```

```
            dd[t][4][5][3] = 0.07;
            dd[t][4][5][4] = 0.12;
            dd[t][4][5][5] = 0.25;

            dd[t][4][6][0] = 0;
            dd[t][4][6][1] = 0;
            dd[t][4][6][2] = 0.05;
            dd[t][4][6][3] = 0.07;
            dd[t][4][6][4] = 0.12;
            dd[t][4][6][5] = 0.25;

   }
}
```

/*CAPACITAT DE SUBMINISTRAMENT*/

int c[PROVEIDORS][COMPONENTS]; //capacitat subministrament per període
execute{

```
  c[1][1]=884606;
  c[1][2]=816560;
  c[1][3]=0;
  c[1][4]=105652;
  c[1][5]=0;
  c[1][6]=360018;

  c[2][1]=0;
  c[2][2]=1088746;
  c[2][3]=253022;
  c[2][4]=0;
  c[2][5]=434771;
  c[2][6]=292514;

  c[3][1]=1020700;
  c[3][2]=0;
  c[3][3]=272485;
  c[3][4]=336825;
  c[3][5]=380424;
  c[3][6]=0;

  c[4][1]=1360933;
  c[4][2]=1360933;
  c[4][3]=389264;
  c[4][4]=431827;
  c[4][5]=543463;
  c[4][6]=450022;
}
```

int C[PROVEIDORS][COMPONENTS]; //capacitat subministrament anual

```
execute{
  C[1][1]=45999525;
  C[1][2]=42461100;
  C[1][3]=0;
  C[1][4]=15493950;
  C[1][5]=0;
  C[1][6]=18720920;

  C[2][1]=0;
  C[2][2]=56614800;
  C[2][3]=13157137;
  C[2][4]=0;
  C[2][5]=22608080;
  C[2][6]=15210747;

  C[3][1]=53076375;
  C[3][2]=0;
  C[3][3]=14169225;
  C[3][4]=17514900;
  C[3][5]=19782070;
  C[3][6]=0;

  C[4][1]=70768500;
  C[4][2]=70768500;
  C[4][3]=20241750;
  C[4][4]=22455000;
  C[4][5]=28260100;
  C[4][6]=23401150;

}
/*DEMANDES*/

int D[PERIODES][PRODUCTES]; //demanda producte q al període t
/*
execute{//demanda constant per trimestres
        D[1][1] = 1288846;
        D[1][2] = 1095520;
        D[1][3] = 173077;
        D[1][4] = 164423;
        D[2][1] = 1288846;
        D[2][2] = 1095520;
        D[2][3] = 173077;
        D[2][4] = 164423;
        D[3][1] = 1288846;
        D[3][2] = 1095520;
        D[3][3] = 173077;
        D[3][4] = 164423;
        D[4][1] = 1288846;
        D[4][2] = 1095520;
        D[4][3] = 173077;
        D[4][4] = 164423;
```

D[5][1] = 1288846;
D[5][2] = 1095520;
D[5][3] = 173077;
D[5][4] = 164423;
D[6][1] = 1288846;
D[6][2] = 1095520;
D[6][3] = 173077;
D[6][4] = 164423;
D[7][1] = 1288846;
D[7][2] = 1095520;
D[7][3] = 173077;
D[7][4] = 164423;
D[8][1] = 1288846;
D[8][2] = 1095520;
D[8][3] = 173077;
D[8][4] = 164423;
D[9][1] = 1288846;
D[9][2] = 1095520;
D[9][3] = 173077;
D[9][4] = 164423;
D[10][1] = 1288846;
D[10][2] = 1095520;
D[10][3] = 173077;
D[10][4] = 164423;
D[11][1] = 1288846;
D[11][2] = 1095520;
D[11][3] = 173077;
D[11][4] = 164423;
D[12][1] = 1288846;
D[12][2] = 1095520;
D[12][3] = 173077;
D[12][4] = 164423;
D[13][1] = 1288846;
D[13][2] = 1095520;
D[13][3] = 173077;
D[13][4] = 164423;

D[14][1] = 1718462;
D[14][2] = 1460693;
D[14][3] = 230770;
D[14][4] = 219231;
D[15][1] = 1718462;
D[15][2] = 1460693;
D[15][3] = 230770;
D[15][4] = 219231;
D[16][1] = 1718462;
D[16][2] = 1460693;
D[16][3] = 230770;
D[16][4] = 219231;
D[17][1] = 1718462;
D[17][2] = 1460693;

D[17][3] = 230770;
D[17][4] = 219231;
D[18][1] = 1718462;
D[18][2] = 1460693;
D[18][3] = 230770;
D[18][4] = 219231;
D[19][1] = 1718462;
D[19][2] = 1460693;
D[19][3] = 230770;
D[19][4] = 219231;
D[20][1] = 1718462;
D[20][2] = 1460693;
D[20][3] = 230770;
D[20][4] = 219231;
D[21][1] = 1718462;
D[21][2] = 1460693;
D[21][3] = 230770;
D[21][4] = 219231;
D[22][1] = 1718462;
D[22][2] = 1460693;
D[22][3] = 230770;
D[22][4] = 219231;
D[23][1] = 1718462;
D[23][2] = 1460693;
D[23][3] = 230770;
D[23][4] = 219231;
D[24][1] = 1718462;
D[24][2] = 1460693;
D[24][3] = 230770;
D[24][4] = 219231;
D[25][1] = 1718462;
D[25][2] = 1460693;
D[25][3] = 230770;
D[25][4] = 219231;
D[26][1] = 1718462;
D[26][2] = 1460693;
D[26][3] = 230770;
D[26][4] = 219231;

D[27][1] = 3007308;
D[27][2] = 2556212;
D[27][3] = 403847;
D[27][4] = 383655;
D[28][1] = 3007308;
D[28][2] = 2556212;
D[28][3] = 403847;
D[28][4] = 383655;
D[29][1] = 3007308;
D[29][2] = 2556212;
D[29][3] = 403847;
D[29][4] = 383655;

```
D[30][1] = 3007308;
D[30][2] = 2556212;
D[30][3] = 403847;
D[30][4] = 383655;
D[31][1] = 3007308;
D[31][2] = 2556212;
D[31][3] = 403847;
D[31][4] = 383655;
D[32][1] = 3007308;
D[32][2] = 2556212;
D[32][3] = 403847;
D[32][4] = 383655;
D[33][1] = 3007308;
D[33][2] = 2556212;
D[33][3] = 403847;
D[33][4] = 383655;
D[34][1] = 3007308;
D[34][2] = 2556212;
D[34][3] = 403847;
D[34][4] = 383655;
D[35][1] = 3007308;
D[35][2] = 2556212;
D[35][3] = 403847;
D[35][4] = 383655;
D[36][1] = 3007308;
D[36][2] = 2556212;
D[36][3] = 403847;
D[36][4] = 383655;
D[37][1] = 3007308;
D[37][2] = 2556212;
D[37][3] = 403847;
D[37][4] = 383655;
D[38][1] = 3007308;
D[38][2] = 2556212;
D[38][3] = 403847;
D[38][4] = 383655;
D[39][1] = 3007308;
D[39][2] = 2556212;
D[39][3] = 403847;
D[39][4] = 383655;
D[40][1] = 3007308;
D[40][2] = 2556212;
D[40][3] = 403847;
D[40][4] = 383655;
D[41][1] = 3007308;
D[41][2] = 2556212;
D[41][3] = 403847;
D[41][4] = 383655;
D[42][1] = 3007308;
D[42][2] = 2556212;
D[42][3] = 403847;
```

```
        D[42][4] = 383655;

        D[43][1] = 2148077;
        D[43][2] = 1825866;
        D[43][3] = 288462;
        D[43][4] = 274039;
        D[44][1] = 2148077;
        D[44][2] = 1825866;
        D[44][3] = 288462;
        D[44][4] = 274039;
        D[45][1] = 2148077;
        D[45][2] = 1825866;
        D[45][3] = 288462;
        D[45][4] = 274039;
        D[46][1] = 2148077;
        D[46][2] = 1825866;
        D[46][3] = 288462;
        D[46][4] = 274039;
        D[47][1] = 2148077;
        D[47][2] = 1825866;
        D[47][3] = 288462;
        D[47][4] = 274039;
        D[48][1] = 2148077;
        D[48][2] = 1825866;
        D[48][3] = 288462;
        D[48][4] = 274039;
        D[49][1] = 2148077;
        D[49][2] = 1825866;
        D[49][3] = 288462;
        D[49][4] = 274039;
        D[50][1] = 2148077;
        D[50][2] = 1825866;
        D[50][3] = 288462;
        D[50][4] = 274039;
        D[51][1] = 2148077;
        D[51][2] = 1825866;
        D[51][3] = 288462;
        D[51][4] = 274039;
        D[52][1] = 2148077;
        D[52][2] = 1825866;
        D[52][3] = 288462;
        D[52][4] = 274039;


}
*/
execute{    //demanda variable
        D[1][1] = 2105115;
        D[1][2] = 1789349;
        D[1][3] = 317308;
        D[1][4] = 191827;
```

D[2][1] = 2062154;
D[2][2] = 1771090;
D[2][3] = 314424;
D[2][4] = 200048;
D[3][1] = 2019192;
D[3][2] = 1752831;
D[3][3] = 311539;
D[3][4] = 208270;
D[4][1] = 1976231;
D[4][2] = 1734573;
D[4][3] = 308654;
D[4][4] = 216491;
D[5][1] = 1933269;
D[5][2] = 1789349;
D[5][3] = 305770;
D[5][4] = 224712;
D[6][1] = 1890308;
D[6][2] = 1844125;
D[6][3] = 302885;
D[6][4] = 232933;
D[7][1] = 1847346;
D[7][2] = 1898901;
D[7][3] = 300000;
D[7][4] = 241154;
D[8][1] = 1804385;
D[8][2] = 1953677;
D[8][3] = 297116;
D[8][4] = 249375;
D[9][1] = 1761423;
D[9][2] = 2008453;
D[9][3] = 294231;
D[9][4] = 257597;
D[10][1] = 1718462;
D[10][2] = 2063229;
D[10][3] = 291347;
D[10][4] = 265818;
D[11][1] = 1675500;
D[11][2] = 2118005;
D[11][3] = 288462;
D[11][4] = 274039;
D[12][1] = 1632539;
D[12][2] = 2172781;
D[12][3] = 285577;
D[12][4] = 282260;
D[13][1] = 1589577;
D[13][2] = 2227557;
D[13][3] = 282693;
D[13][4] = 290481;

D[14][1] = 1546615;
D[14][2] = 2172781;

D[14][3] = 279808;
D[14][4] = 298703;
D[15][1] = 1503654;
D[15][2] = 2118005;
D[15][3] = 276924;
D[15][4] = 306924;
D[16][1] = 1525135;
D[16][2] = 2063229;
D[16][3] = 274039;
D[16][4] = 315145;
D[17][1] = 1589577;
D[17][2] = 2008453;
D[17][3] = 271154;
D[17][4] = 323366;
D[18][1] = 1654019;
D[18][2] = 1953677;
D[18][3] = 268270;
D[18][4] = 331587;
D[19][1] = 1718462;
D[19][2] = 1898901;
D[19][3] = 265385;
D[19][4] = 320626;
D[20][1] = 1782904;
D[20][2] = 1844125;
D[20][3] = 262500;
D[20][4] = 309664;
D[21][1] = 1847346;
D[21][2] = 1789349;
D[21][3] = 259616;
D[21][4] = 298703;
D[22][1] = 1911789;
D[22][2] = 1734573;
D[22][3] = 256731;
D[22][4] = 287741;
D[23][1] = 1976231;
D[23][2] = 1679797;
D[23][3] = 253847;
D[23][4] = 276779;
D[24][1] = 2040673;
D[24][2] = 1625021;
D[24][3] = 250962;
D[24][4] = 265818;
D[25][1] = 2105115;
D[25][2] = 1661538;
D[25][3] = 248077;
D[25][4] = 254856;
D[26][1] = 2169558;
D[26][2] = 1698055;
D[26][3] = 245193;
D[26][4] = 243895;

D[27][1] = 223400;
D[27][2] = 1734573;
D[27][3] = 242308;
D[27][4] = 232933;
D[28][1] = 2298442;
D[28][2] = 1771090;
D[28][3] = 239423;
D[28][4] = 221972;
D[29][1] = 2362885;
D[29][2] = 1825866;
D[29][3] = 236539;
D[29][4] = 211010;
D[30][1] = 2427327;
D[30][2] = 1880642;
D[30][3] = 233654;
D[30][4] = 200048;
D[31][1] = 2341404;
D[31][2] = 1935418;
D[31][3] = 230770;
D[31][4] = 189087;
D[32][1] = 2255481;
D[32][2] = 1990194;
D[32][3] = 227885;
D[32][4] = 178125;
D[33][1] = 2169558;
D[33][2] = 2044970;
D[33][3] = 225000;
D[33][4] = 167164;
D[34][1] = 2083635;
D[34][2] = 2099746;
D[34][3] = 222116;
D[34][4] = 156202;
D[35][1] = 1997712;
D[35][2] = 2154522;
D[35][3] = 219231;
D[35][4] = 145241;
D[36][1] = 1911789;
D[36][2] = 2209298;
D[36][3] = 216347;
D[36][4] = 134279;
D[37][1] = 1825865;
D[37][2] = 2264074;
D[37][3] = 213462;
D[37][4] = 123318;
D[38][1] = 1739942;
D[38][2] = 2227557;
D[38][3] = 210577;
D[38][4] = 137020;
D[39][1] = 1654019;
D[39][2] = 2191039;
D[39][3] = 207693;

D[39][4] = 150721;
D[40][1] = 1568096;
D[40][2] = 2154522;
D[40][3] = 204808;
D[40][4] = 164423;
D[41][1] = 1482173;
D[41][2] = 2118005;
D[41][3] = 201923;
D[41][4] = 178125;
D[42][1] = 1396250;
D[42][2] = 2081487;
D[42][3] = 199039;
D[42][4] = 191827;

D[43][1] = 1310326;
D[43][2] = 2044969;
D[43][3] = 196154;
D[43][4] = 205529;
D[44][1] = 1224403;
D[44][2] = 2008452;
D[44][3] = 193269;
D[44][4] = 219231;
D[45][1] = 1138480;
D[45][2] = 1971935;
D[45][3] = 190384;
D[45][4] = 213750;
D[46][1] = 1052557;
D[46][2] = 1935417;
D[46][3] = 187500;
D[46][4] = 208269;
D[47][1] = 966634;
D[47][2] = 1898900;
D[47][3] = 184615;
D[47][4] = 202788;
D[48][1] = 1074038;
D[48][2] = 1862383;
D[48][3] = 181731;
D[48][4] = 197308;
D[49][1] = 1181442;
D[49][2] = 1825866;
D[49][3] = 178846;
D[49][4] = 191827;
D[50][1] = 1288846;
D[50][2] = 1789348;
D[50][3] = 175961;
D[50][4] = 186346;
D[51][1] = 1396250;
D[51][2] = 1752831;
D[51][3] = 173077;
D[51][4] = 180865;
D[52][1] = 1503653;

```
        D[52][2] = 1716314;
        D[52][3] = 170192;
        D[52][4] = 175384;

}

float n[PRODUCTES][COMPONENTS]; //número d'unitats de component i per produir q
execute{
   n[1][1] = 0.3;
   n[1][2] = 0.3;
   n[1][3] = 0;
   n[1][4] = 0.15;
   n[1][5] = 0.10;
   n[1][6] = 0.15;

   n[2][1] = 0.3;
   n[2][2] = 0.3;
   n[2][3] = 0.15;
   n[2][4] = 0;
   n[2][5] = 0.18;
   n[2][6] = 0.07;

   n[3][1] = 0.3;
   n[3][2] = 0.3;
   n[3][3] = 0.4;
   n[3][4] = 0;
   n[3][5] = 0;
   n[3][6] = 0;

   n[4][1] = 0.3;
   n[4][2] = 0.3;
   n[4][3] = 0;
   n[4][4] = 0.40;
   n[4][5] = 0;
   n[4][6] = 0;

}
int ro[PERIODES][PRODUCTES]; //número unitats de producte q en el periode t, per hora i treballador
execute{
   for(var t in PERIODES){
      for(var q in PRODUCTES){
         ro[t][q] = 1500;
      }
   }
}
float PVP[PERIODES][PRODUCTES]; // preu venta producte
execute{
   for(var t in PERIODES){
        PVP[t][1] = 1.1504;
        PVP[t][2] = 1.2857;
        PVP[t][3] = 0.7867;
```

```
        PVP[t][4] = 0.7039;

   }
}
float PVP2[PERIODES][PROVEIDORS][COMPONENTS]; //preu compra component
execute{
   for(var t in PERIODES){
      PVP2[t][1][1] = 0.47414583;
      PVP2[t][1][2] = 0.47414583;
      PVP2[t][1][3] = 0;
      PVP2[t][1][4] = 0.18277698;
      PVP2[t][1][5] = 0;
      PVP2[t][1][6] = 0.10568142;

      PVP2[t][2][1] = 0;
      PVP2[t][2][2] = 0.41230072;
      PVP2[t][2][3] = 0.17763491;
      PVP2[t][2][4] = 0;
      PVP2[t][2][5] = 0.121266;
      PVP2[t][2][6] = 0.09189689;

      PVP2[t][3][1] = 0.35045562;
      PVP2[t][3][2] = 0;
      PVP2[t][3][3] = 0.15098968;
      PVP2[t][3][4] = 0.13509603;
      PVP2[t][3][5] = 0.1030761;
      PVP2[t][3][6] = 0;

      PVP2[t][4][1] = 0.206150362;
      PVP2[t][4][2] = 0.206150362;
      PVP2[t][4][3] = 0.088817457;
      PVP2[t][4][4] = 0.079468251;
      PVP2[t][4][5] = 0.060632998;
      PVP2[t][4][6] = 0.045948444;

   }
}

/*COSTOS FIXOS*/

int u[PERIODES][PROVEIDORS]; //cost de llançament
execute{
   for(var t in PERIODES){
      u[t][1] = 190;
      u[t][2] = 175;
      u[t][3] = 150;
      u[t][4] = 138;

   }
}
```

```
float ACTUAL[PERIODES]; //factor per actualitzar costos
execute{
   for(var t in PERIODES){
      ACTUAL[t] = 0.97;
   }
}
float cp[PERIODES][PRODUCTES]; //costos de producció de producte q
execute{
   for(var t in PERIODES){
     cp[t][1] = 0.1726;
     cp[t][2] = 0.1929;
     cp[t][3] = 0.1180;
     cp[t][4] = 0.1056;
   }
}
float cr[PERIODES][PRODUCTES]; //costos de subcontractar producte q
execute{
   for(var t in PERIODES){
      cr[t][1] = 1,38048;
      cr[t][2] = 1,54284;
      cr[t][3] = 0,94404;
      cr[t][4] = 0,84468;

   }
}
/*RECURSOS HUMANS*/

int hores[PERIODES]; //hores treball
execute{
   for(var t in PERIODES){
      hores[t] = 35;
   }
}
int W_0 = 75; //número de treballadors incial
int LW = 64; //número mínim treballadors
int UW = 86; //número màxim treballadors
float E[PERIODES]; //número màxim d'hores extres per període
execute{
  for(var t in PERIODES){
    E[t] = 2;
  }
}
float cw[PERIODES]; //cost treballador
execute{
   for(var t in PERIODES){
      cw[t] = 442.3;
   }
}
float ce[PERIODES]; //cost hora extra
execute{
   for(var t in PERIODES){
```

```
      ce[t] = 17.5;
   }
}
float cc[PERIODES]; //cost contractació
execute{
   for(var t in PERIODES){
      cc[t] = 442.3;
   }
}
float ca[PERIODES]; //cost acomiadament
execute{
   for(var t in PERIODES){
      ca[t] = 884.6;
   }
}

int L[PERIODES][PROVEIDORS][COMPONENTS];
execute{
   for(var t in PERIODES){
      for(var i in COMPONENTS){
        L[t][1][i] = 1;
        L[t][2][i] = 2;
        L[t][3][i] = 4;
        L[t][4][i] = 26;
      }
   }
}
/*
execute{
  for(var i in COMPONENTS){
L [ 1 ][ 1 ] [i]= 1 ;
L [ 1 ][ 2 ] [i]= 2 ;
L [ 1 ][ 3 ] [i]= 4 ;
L [ 1 ][ 4 ] [i]= 26 ;
L [ 2 ][ 1 ] [i]= 2 ;
L [ 2 ][ 2 ] [i]= 3 ;
L [ 2 ][ 3 ] [i]= 3 ;
L [ 2 ][ 4 ] [i]= 24 ;
L [ 3 ][ 1 ] [i]= 2 ;
L [ 3 ][ 2 ] [i]= 2 ;
L [ 3 ][ 3 ] [i]= 5 ;
L [ 3 ][ 4 ] [i]= 20 ;
L [ 4 ][ 1 ] [i]= 1 ;
L [ 4 ][ 2 ] [i]= 3 ;
L [ 4 ][ 3 ] [i]= 3 ;
L [ 4 ][ 4 ] [i]= 25 ;
L [ 5 ][ 1 ] [i]= 1 ;
L [ 5 ][ 2 ] [i]= 1 ;
L [ 5 ][ 3 ] [i]= 5 ;
L [ 5 ][ 4 ] [i]= 18 ;
L [ 6 ][ 1 ] [i]= 1 ;
```

L [6][2] [i]= 2 ;
L [6][3] [i]= 3 ;
L [6][4] [i]= 22 ;
L [7][1] [i]= 2 ;
L [7][2] [i]= 4 ;
L [7][3] [i]= 4 ;
L [7][4] [i]= 24 ;
L [8][1] [i]= 1 ;
L [8][2] [i]= 1 ;
L [8][3] [i]= 3 ;
L [8][4] [i]= 17 ;
L [9][1] [i]= 1 ;
L [9][2] [i]= 2 ;
L [9][3] [i]= 5 ;
L [9][4] [i]= 25 ;
L [10][1] [i]= 1 ;
L [10][2] [i]= 3 ;
L [10][3] [i]= 4 ;
L [10][4] [i]= 20 ;
L [11][1] [i]= 2 ;
L [11][2] [i]= 2 ;
L [11][3] [i]= 3 ;
L [11][4] [i]= 19 ;
L [12][1] [i]= 1 ;
L [12][2] [i]= 3 ;
L [12][3] [i]= 5 ;
L [12][4] [i]= 23 ;
L [13][1] [i]= 2 ;
L [13][2] [i]= 3 ;
L [13][3] [i]= 5 ;
L [13][4] [i]= 27 ;
L [14][1] [i]= 3 ;
L [14][2] [i]= 4 ;
L [14][3] [i]= 4 ;
L [14][4] [i]= 25 ;
L [15][1] [i]= 3 ;
L [15][2] [i]= 3 ;
L [15][3] [i]= 6 ;
L [15][4] [i]= 21 ;
L [16][1] [i]= 2 ;
L [16][2] [i]= 4 ;
L [16][3] [i]= 4 ;
L [16][4] [i]= 26 ;
L [17][1] [i]= 2 ;
L [17][2] [i]= 2 ;
L [17][3] [i]= 6 ;
L [17][4] [i]= 19 ;
L [18][1] [i]= 2 ;
L [18][2] [i]= 3 ;
L [18][3] [i]= 4 ;
L [18][4] [i]= 23 ;

L [19][1] [i]= 3 ;
L [19][2] [i]= 5 ;
L [19][3] [i]= 5 ;
L [19][4] [i]= 25 ;
L [20][1] [i]= 2 ;
L [20][2] [i]= 2 ;
L [20][3] [i]= 4 ;
L [20][4] [i]= 18 ;
L [21][1] [i]= 2 ;
L [21][2] [i]= 3 ;
L [21][3] [i]= 6 ;
L [21][4] [i]= 26 ;
L [22][1] [i]= 2 ;
L [22][2] [i]= 4 ;
L [22][3] [i]= 5 ;
L [22][4] [i]= 21 ;
L [23][1] [i]= 3 ;
L [23][2] [i]= 3 ;
L [23][3] [i]= 4 ;
L [23][4] [i]= 20 ;
L [24][1] [i]= 2 ;
L [24][2] [i]= 4 ;
L [24][3] [i]= 6 ;
L [24][4] [i]= 24 ;
L [25][1] [i]= 1 ;
L [25][2] [i]= 2 ;
L [25][3] [i]= 4 ;
L [25][4] [i]= 26 ;
L [26][1] [i]= 2 ;
L [26][2] [i]= 3 ;
L [26][3] [i]= 3 ;
L [26][4] [i]= 24 ;
L [27][1] [i]= 2 ;
L [27][2] [i]= 2 ;
L [27][3] [i]= 5 ;
L [27][4] [i]= 20 ;
L [28][1] [i]= 1 ;
L [28][2] [i]= 3 ;
L [28][3] [i]= 3 ;
L [28][4] [i]= 25 ;
L [29][1] [i]= 1 ;
L [29][2] [i]= 1 ;
L [29][3] [i]= 5 ;
L [29][4] [i]= 18 ;
L [30][1] [i]= 1 ;
L [30][2] [i]= 2 ;
L [30][3] [i]= 3 ;
L [30][4] [i]= 22 ;
L [31][1] [i]= 2 ;
L [31][2] [i]= 4 ;
L [31][3] [i]= 4 ;

```
L [ 31 ][ 4 ] [i]= 24 ;
L [ 32 ][ 1 ] [i]= 1 ;
L [ 32 ][ 2 ] [i]= 1 ;
L [ 32 ][ 3 ] [i]= 3 ;
L [ 32 ][ 4 ] [i]= 17 ;
L [ 33 ][ 1 ] [i]= 1 ;
L [ 33 ][ 2 ] [i]= 2 ;
L [ 33 ][ 3 ] [i]= 5 ;
L [ 33 ][ 4 ] [i]= 25 ;
L [ 34 ][ 1 ] [i]= 1 ;
L [ 34 ][ 2 ] [i]= 3 ;
L [ 34 ][ 3 ] [i]= 4 ;
L [ 34 ][ 4 ] [i]= 20 ;
L [ 35 ][ 1 ] [i]= 2 ;
L [ 35 ][ 2 ] [i]= 2 ;
L [ 35 ][ 3 ] [i]= 3 ;
L [ 35 ][ 4 ] [i]= 19 ;
L [ 36 ][ 1 ] [i]= 1 ;
L [ 36 ][ 2 ] [i]= 3 ;
L [ 36 ][ 3 ] [i]= 5 ;
L [ 36 ][ 4 ] [i]= 23 ;
L [ 37 ][ 1 ] [i]= 2 ;
L [ 37 ][ 2 ] [i]= 3 ;
L [ 37 ][ 3 ] [i]= 5 ;
L [ 37 ][ 4 ] [i]= 27 ;
L [ 38 ][ 1 ] [i]= 3 ;
L [ 38 ][ 2 ] [i]= 4 ;
L [ 38 ][ 3 ] [i]= 4 ;
L [ 38 ][ 4 ] [i]= 25 ;
L [ 39 ][ 1 ] [i]= 3 ;
L [ 39 ][ 2 ] [i]= 3 ;
L [ 39 ][ 3 ] [i]= 6 ;
L [ 39 ][ 4 ] [i]= 21 ;
L [ 40 ][ 1 ] [i]= 2 ;
L [ 40 ][ 2 ] [i]= 4 ;
L [ 40 ][ 3 ] [i]= 4 ;
L [ 40 ][ 4 ] [i]= 26 ;
L [ 41 ][ 1 ] [i]= 2 ;
L [ 41 ][ 2 ] [i]= 2 ;
L [ 41 ][ 3 ] [i]= 6 ;
L [ 41 ][ 4 ] [i]= 19 ;
L [ 42 ][ 1 ] [i]= 2 ;
L [ 42 ][ 2 ] [i]= 3 ;
L [ 42 ][ 3 ] [i]= 4 ;
L [ 42 ][ 4 ] [i]= 23 ;
L [ 43 ][ 1 ] [i]= 3 ;
L [ 43 ][ 2 ] [i]= 5 ;
L [ 43 ][ 3 ] [i]= 5 ;
L [ 43 ][ 4 ] [i]= 25 ;
L [ 44 ][ 1 ] [i]= 2 ;
L [ 44 ][ 2 ] [i]= 2 ;
```

```
L [ 44 ][ 3 ] [i]= 4 ;
L [ 44 ][ 4 ] [i]= 18 ;
L [ 45 ][ 1 ] [i]= 2 ;
L [ 45 ][ 2 ] [i]= 3 ;
L [ 45 ][ 3 ] [i]= 6 ;
L [ 45 ][ 4 ] [i]= 26 ;
L [ 46 ][ 1 ] [i]= 2 ;
L [ 46 ][ 2 ] [i]= 4 ;
L [ 46 ][ 3 ] [i]= 5 ;
L [ 46 ][ 4 ] [i]= 21 ;
L [ 47 ][ 1 ] [i]= 3 ;
L [ 47 ][ 2 ] [i]= 3 ;
L [ 47 ][ 3 ] [i]= 4 ;
L [ 47 ][ 4 ] [i]= 20 ;
L [ 48 ][ 1 ] [i]= 2 ;
L [ 48 ][ 2 ] [i]= 4 ;
L [ 48 ][ 3 ] [i]= 6 ;
L [ 48 ][ 4 ] [i]= 24 ;
L [ 49 ][ 1 ] [i]= 1 ;
L [ 49 ][ 2 ] [i]= 2 ;
L [ 49 ][ 3 ] [i]= 4 ;
L [ 49 ][ 4 ] [i]= 17 ;
L [ 50 ][ 1 ] [i]= 1 ;
L [ 50 ][ 2 ] [i]= 2 ;
L [ 50 ][ 3 ] [i]= 3 ;
L [ 50 ][ 4 ] [i]= 14 ;
L [ 51 ][ 1 ] [i]= 2 ;
L [ 51 ][ 2 ] [i]= 2 ;
L [ 51 ][ 3 ] [i]= 2 ;
L [ 51 ][ 4 ] [i]= 13 ;
L [ 52 ][ 1 ] [i]= 1 ;
L [ 52 ][ 2 ] [i]= 2 ;
L [ 52 ][ 3 ] [i]= 4 ;
L [ 52 ][ 4 ] [i]= 16 ;
  }
}
*/
/*CONTROL D'ESTOCS DELS PRODUCTES*/

int sq_0_1 = 2105100;
int sq_0_2 = 1789300;
int sq_0_3 = 317310;
int sq_0_4 = 191830;

int CMq[PERIODES]; //capacitat magatzem producte q
execute{
   for(var t in PERIODES){
      CMq[t] = 43165890;
   }
}
float csq[PERIODES][PRODUCTES]; //cost d'estoc
```

```
execute{
   for(var t in PERIODES){
      csq[t][1] = 0.1710769496;
      csq[t][2] = 0.170994019;
      csq[t][3] = 0.171030604;
      csq[t][4] = 0.171001336;
   }
}
/*CONTROL D'ESTOCS DELS COMPONENTS*/

int CMi[PERIODES]; //capacitat magatzem producte i
execute{
   for(var t in PERIODES){
      CMi[t] = 58166700;
   }
}
float csi[PERIODES][COMPONENTS]; //cost d'estoc
execute{
   for(var t in PERIODES){
      csi[t][1] =0.17030;
      csi[t][2] =0.17051;
      csi[t][3] =0.17049;
      csi[t][4] =0.17036;
      csi[t][5] =0.17003;
      csi[t][6] =0.17089;
   }
}
int s_seg_i[PERIODES][COMPONENTS] ;
execute{
   for(var t in PERIODES){
      s_seg_i[t][1] = 3877726;
      s_seg_i[t][2] = 3877726;
      s_seg_i[t][3] = 1109137;
      s_seg_i[t][4] = 1230411;
      s_seg_i[t][5] = 1548499;
      s_seg_i[t][6] = 1282255;
   }
}

/*COMPRA PER LOTS*/

int LOTmin[PERIODES][PROVEIDORS][COMPONENTS];
execute{
  for(var t in PERIODES){
     LOTmin[t][1][1]=88461;
     LOTmin[t][1][2]=81656;
     LOTmin[t][1][4]=10565;
     LOTmin[t][1][6]=36002;
     LOTmin[t][2][2]=108875;
     LOTmin[t][2][3]=25302;
     LOTmin[t][2][5]=43477;
```

```
    LOTmin[t][2][6]=29251;
    LOTmin[t][3][1]=27000;
    LOTmin[t][3][3]=27000;
    LOTmin[t][3][4]=27000;
    LOTmin[t][3][5]=27000;
    LOTmin[t][4][1]=27000;
    LOTmin[t][4][2]=27000;
    LOTmin[t][4][3]=27000;
    LOTmin[t][4][4]=27000;
    LOTmin[t][4][5]=27000;
    LOTmin[t][4][6]=27000;

  }
}

int LOTmax[PERIODES][PROVEIDORS][COMPONENTS];
execute{
  for(var t in PERIODES){
    LOTmax[t][1][1]=707685;
    LOTmax[t][1][2]=653248;
    LOTmax[t][1][4]=84522;
    LOTmax[t][1][6]=288014;
    LOTmax[t][2][2]=870997;
    LOTmax[t][2][3]=202418;
    LOTmax[t][2][5]=347817;
    LOTmax[t][2][6]=234011;
    LOTmax[t][3][1]=816560;
    LOTmax[t][3][3]=217988;
    LOTmax[t][3][4]=269460;
    LOTmax[t][3][5]=304339;
    LOTmax[t][4][1]=1088746;
    LOTmax[t][4][2]=1088746;
    LOTmax[t][4][3]=311411;
    LOTmax[t][4][4]=345462;
    LOTmax[t][4][5]=434770;
    LOTmax[t][4][6]=360018;

  }
}

float c_LOT1[PERIODES][PROVEIDORS][COMPONENTS];//min
execute{
for(var t in PERIODES){
  for(var j in PROVEIDORS){
    for(var i in k[j]){
      c_LOT1[t][j][i] = 0.20;

    }
    }
  }
}
```

```
float c_LOT2[PERIODES][PROVEIDORS][COMPONENTS];//max
execute{
for(var t in PERIODES){
  for(var j in PROVEIDORS){
    for(var i in k[j]){
      c_LOT2[t][j][i] = 0.30;

    }
    }
  }
}
/*PICKING*/

float c_PICK[PERIODES][PROVEIDORS]; //cost
execute{
   for(var t in PERIODES){
      c_PICK[t][1] = 506.9;
      c_PICK[t][2] = 805.2;
      c_PICK[t][3] = 370.6;
      c_PICK[t][4] = 170.8;
   }
}

int num[PERIODES][PROVEIDORS]; //número de tipus de producte sense sobrecost
execute{
   for(var t in PERIODES){
      num[t][1] = 2;
      num[t][2] = 2;
      num[t][3] = 2;
      num[t][4] = 3;
   }
}
/*COMPTE DE CRÈDIT REMUNERAT*/

float B =1000000; //
float i1[PERIODES];
execute{
   for(var t in PERIODES){
      i1[t] = 0.07;
   }
}
float i2[PERIODES];
execute{
   for(var t in PERIODES){
      i2[t] = 0.04;
   }
}
float i3[PERIODES];
execute{
   for(var t in PERIODES){
      i3[t] = 0.08;
```

```
   }
}

float BF[PERIODES];
execute{
   for(var t in PERIODES){
      BF[t] = 0;
   }
}
/*------------------------------VARIABLES----------------------------------------*/

dvar float+ X[PERIODES][PROVEIDORS][COMPONENTS];
dvar float+ P[PERIODES][PRODUCTES];
dvar int+ un[PERIODES][PROVEIDORS] in 0..1;
dvar float+ sub[PERIODES][PRODUCTES];

/*DESCOMPTES*/

dvar float+ V[PERIODES][PROVEIDORS][DESCOMPTES]; //per volum de negoci
dvar float+ V1[PERIODES][PROVEIDORS][COMPONENTS][DESCOMPTES]; //per unitats comprades
dvar int+ Y[PERIODES][PROVEIDORS][DESCOMPTES] in 0..1;
dvar int+ Y1[PERIODES][PROVEIDORS][COMPONENTS][DESCOMPTES] in 0..1;

/*RECURSOS HUMANS*/

dvar int+ W[PERIODES];
dvar int+ W1[PERIODES];
dvar int+ W2[PERIODES];
dvar int+ whe[PERIODES];//hores extres

/*ESTOCS*/

dvar float+ si[PERIODES][COMPONENTS]; //component i
dvar float+ sq[PERIODES][PRODUCTES]; //producte q

/*COMPRA PER LOTS*/

dvar int+ defecte[PERIODES][PROVEIDORS][COMPONENTS];
dvar int+ exces[PERIODES][PROVEIDORS][COMPONENTS];
dvar int+ M[PERIODES][PROVEIDORS][COMPONENTS] in 0..1;

/*COMPTE DE CRÈDIT REMUNERADA*/

dvar float+ b_mas[PERIODES];
dvar float+ b_minus[PERIODES];

dvar float+ entrades[PERIODES];
dvar float+ sortides[PERIODES];

/*SOBRE COST PER PICKING*/
```

```
dvar int+ PICK1[PERIODES][PROVEIDORS];
dvar int+ PICK2[PERIODES][PROVEIDORS];
dvar int+ BB[PERIODES][PROVEIDORS][COMPONENTS] in 0..1;

constraint c1;
constraint c2;
constraint c3;
constraint c4;
constraint c5;
constraint c6;
constraint c7;
constraint c8;
constraint c9;
constraint c10;
constraint c11;
constraint c12;
constraint c13;
constraint c14;
constraint c15;


/*------------------------------FUNCIÓ OBJECTIU-----------------------------------------*/

minimize sum(t in 1..T)(sum(j in S)sum(r in DESCOMPTES)V[t][j][r]*(1-d[t][j][r])*ACTUAL[t] +

      sum(j in S2)sum(i in k[j])sum(r in DESCOMPTES)V1[t][j][i][r]*(1-dd[t][j][i][r])*ACTUAL[t] +

      sum(q in 1..Q)(cp[t][q]*P[t][q]+cr[t][q]*sub[t][q]) +

      (cw[t]*W[t])+(cc[t]*W1[t])+(ca[t]*W2[t])+(ce[t]*whe[t]) +

      sum(j in 1..J)u[t][j]*un[t][j] +

      sum(i in 1..I)csi[t][i]*si[t][i] +

      sum(q in 1..Q)csq[t][q]*sq[t][q]+

      sum(j in 1..J)c_PICK[t][j]*PICK1[t][j] +

      b_minus[t]*(i3[t]-i1[t])+

     sum(j in 1..J)sum(i in k[j])PVP2[t][j][i]*(1+c_LOT1[t][j][i])*defecte[t][j][i] +

     sum(j in 1..J)sum(i in k[j])PVP2[t][j][i]*(1+c_LOT2[t][j][i])*exces[t][j][i]);


subject to{

  c1=/*inicialització de variables*/
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```
W[0]==W_0;
b_mas[0]==0;
b_minus[0]==0;
sq[0][1]==sq_0_1;
sq[0][2]==sq_0_2;
sq[0][3]==sq_0_3;
sq[0][4]==sq_0_4;

forall(j in 1..J){
forall(i in 1..I){
        X[0][j][i]==0;
        X[-1][j][i]==0;
        X[-2][j][i]==0;
        X[-3][j][i]==0;
        X[-4][j][i]==0;
        X[-5][j][i]==0;
        X[-6][j][i]==0;
        X[-7][j][i]==0;
        X[-8][j][i]==0;
        X[-9][j][i]==0;
        X[-10][j][i]==0;
        X[-11][j][i]==0;
        X[-12][j][i]==0;
        X[-13][j][i]==0;
        X[-14][j][i]==0;
        X[-15][j][i]==0;
        X[-16][j][i]==0;
        X[-17][j][i]==0;
        X[-18][j][i]==0;
        X[-19][j][i]==0;
        X[-20][j][i]==0;
        X[-21][j][i]==0;
        X[-22][j][i]==0;
        X[-23][j][i]==0;
        X[-24][j][i]==0;
        X[-25][j][i]==0;
        X[-26][j][i]==0;
}
}

c2=/*volum de negoci abans d'aplicar descomptes amb proveïdor j*/
forall(t in 1..T){
  forall(j in S){
      sum(r in 1..R)V[t][j][r]==sum(i in k[j])X[t][j][i]*PVP2[t][j][i];
   }
}
c3=/*volum de negoci per quantitat de producte*/
forall(t in 1..T){
  forall(j in S2){
      forall(i in k[j]){
        sum(r in 1..R)V1[t][j][i][r]==X[t][j][i]*PVP2[t][j][i];
```

```
      }
   }
}
c4=/*restricció de capacitat*/
forall(t in 1..T){
   forall(j in 1..J){
      forall(i in k[j]){
         X[t][j][i]<=c[j][i];
      }
   }
}
forall(j in 1..J){
  forall(i in k[j]){
        sum(t in 1..T)X[t][j][i]<=C[j][i];

   }
}

c5=/*descompte per volum de negoci*/
forall(t in 1..T){
  forall(j in S){
      forall(r in 1..R){
         b[t][j][r-1]*Y[t][j][r]<=V[t][j][r]&&V[t][j][r]<=b[t][j][r]*Y[t][j][r];

      }
   }
}
forall(t in 1..T){
  forall(j in S){
    sum(r in 1..R)Y[t][j][r]==1;
  }
}

c6=/*descompte per quantitat total*/
forall(t in 1..T){
  forall(j in S2){
      forall(r in 1..R){
         forall(i in k[j]){
            bb[t][j][i][r-1]*Y1[t][j][i][r]<=V1[t][j][i][r]&&V1[t][j][i][r]<=bb[t][j][i][r]*Y1[t][j][i][r];

         }
      }
   }
}
forall(t in 1..T){
  forall(j in S2){
      forall(i in k[j]){
          sum(r in 1..R)Y1[t][j][i][r]==1;
      }
  }
}
```

```
c7=/*si existeix compra, existeix comanda*/
forall(t in 1..T){
  forall(j in 1..J){
    forall(i in 1..I){
      sum(i in k[j])X[t][j][i]<=NUM*un[t][j];
    }
  }
}
c8= /*control dels RRHH*/
forall(t in 1..T){
  sum(q in 1..Q)(P[t][q]/ro[t][q])==W[t]*hores[t]+whe[t];
  whe[t]<=W[t]*E[t];
  W[t]==W[t-1]+W1[t]-W2[t];
  LW<=W[t]&&W[t]<=UW;
 }

c9=/*control inventari component*/
forall(t in 1..T){
  forall(i in 1..I){
    si[t-1][i]+s_seg_i[t][i]+sum(j in PROVEIDORS:i in k[j])X[(t-L[t][j][i])][j][i]==sum(q in
1..Q)D[t][q]*n[q][i]+si[t][i]+s_seg_i[t][i];
  }
}

c10=
forall(t in 1..T){
  sum(i in 1..I)(si[t][i]+s_seg_i[t][i])<=CMi[t];
}

c11=/*control inventari producte*/
forall(t in 1..T){
  forall(q in 1..Q){
    sq[t-1][q]+P[t][q]+sub[t][q]==D[t][q]+sq[t][q];
  }
}

c12=
forall(t in 1..T){
  sum(q in 1..Q)sq[t][q]<=CMq[t];
}

c13=/*compra per lots*/
forall(t in 1..T){
  forall(j in 1..J){
    forall(i in k[j]){
      X[t][j][i]>=LOTmin[t][j][i]*M[t][j][i] - defecte[t][j][i];
      X[t][j][i]<=LOTmax[t][j][i]*M[t][j][i] + exces[t][j][i];
```

```
      }
   }
}

c14=/*sobrecost per picking*/
 forall(t in 1..T){
    forall(j in 1..J){
       forall(i in k[j]){
          X[t][j][i]<=c[j][i]*BB[t][j][i];

       }
    }
 }
 forall(t in 1..T){
    forall(j in 1..J){
      sum(i in k[j])BB[t][j][i]-num[t][j]==PICK1[t][j]-PICK2[t][j];
    }
 }

 c15=/*compte de crèdit account*/
 forall(t in 1..T){
    b_minus[t] <= B;
 }

 forall(t in 1..T){
    b_mas[t] - b_minus[t] == b_mas[t-1]+entrades[t] - b_minus[t-1]-sortides[t];

 }

  forall(t in 1..T){
    entrades[t]== b_mas[t-1]*(i2[t])+BF[t] + sum(q in 1..Q)PVP[t][q]*D[t][q];

    sortides[t]== b_minus[t-1]*(i3[t]-i1[t])+/*B*i3[t]+*/
    sum(q in 1..Q)(csq[t][q]*sq[t][q]+cp[t][q]*P[t][q]+cr[t][q]*sub[t][q])+
    sum(i in 1..I)csi[t][i]*si[t][i] +
    cw[t]*W[t]+cc[t]*W1[t]+ca[t]*W2[t]+ce[t]*whe[t] +
    sum(j in S)sum(r in 1..R)V[t][j][r]*(1-d[t][j][r])*ACTUAL[t] +
    sum(j in S2)sum(i in 1..I)sum(r in 1..R)V1[t][j][i][r]*(1-dd[t][j][i][r])*ACTUAL[t] +
    sum(j in 1..J)c_PICK[t][j]*PICK1[t][j] +
    sum(j in 1..J)u[t][j]*un[t][j]+
    sum(j in 1..J)sum(i in k[j])PVP2[t][j][i]*(1+c_LOT1[t][j][i])*defecte[t][j][i] +
    sum(j in 1..J)sum(i in k[j])PVP2[t][j][i]*(1+c_LOT2[t][j][i])*exces[t][j][i];


 }}
```