Optimization assignment — AMPL V3 2

Siddharth Bhat(20161105)

March 9, 2019

```
set A := A1 A2 A3;

param maxdemand :=
    A1 5300
    A2 4500
    A3 5400;


param sellingprice :=
    A1 124
    A2 109
    A3 115;

param prodcost :=
    A1 73.30
    A2 52.90
    A3 65.40;

param prodquota :=
    A1 500
    A2 450
    A3 550;
```

```
set A;
set DAYS := {1..30};
param maxdemand{i in A};
param sellingprice{i in A};
param prodcost{i in A};
param activationcost{i in A};

var is_prod_on_day{A, DAYS} binary;
var nprod_on_day {A, DAYS} integer;

max:
  sum {a in A, day in DAYS}
      is_prod_on_day[a, day] * nprod_on_day[a, day] *
      (sellingprice[a] - prodcost[a]) - is_prod_on_day[a, day] * activationcost[a];

# total produce less than max demand
subject to max_demands_per_month {a in A}:
    (sum {day in DAYS}
        is_prod_on_day[a, day] * nprod_on_day[a, day]) <= maxdemand[a];

# produce per day is less than quota
subject to max_quota_per_day {a in A, day in DAYS}:
    is_prod_on_day[a, day] * nprod_on_day[a, day]  <= prodquota[a];

# Production can only be active 22 days of the month
subject to prod_only_active_on_22_days{a in A}:
    sum {day in DAYS} is_prod_on_day[a, day] <= 22;
```

Figure 1: Q1

```
set A := A1 A2 A3;

param maxdemand :=
    A1 5300
    A2 4500
    A3 5400;


param sellingprice :=
    A1 124
    A2 109
    A3 115;

param prodcost :=
    A1 73.30
    A2 52.90
    A3 65.40;

param prodquota :=
    A1 500
    A2 450
    A3 550;

param activationcost :=
    A1 170000
    A2 1500000
    A3 100000
```

```
set A;
set DAYS := {1..30};
param maxdemand{i in A};
param sellingprice{i in A};
param prodcost{i in A};
param prodquota{i in A};
param minbatch{i in A};

var is_prod_on_day{A, DAYS} binary;
var nprod_on_day {A, DAYS} integer;

max:
  sum {a in A, day in DAYS}
      is_prod_on_day[a, day] * nprod_on_day[a, day] *
      (sellingprice[a] - prodcost[a]);

# total produce less than max demand
subject to max_demands_per_month {a in A}:
    (sum {day in DAYS}
        is_prod_on_day[a, day] * nprod_on_day[a, day]) <= maxdemand[a];

# produce per day is less than quota
subject to max_quota_per_day {a in A, day in DAYS}:
    is_prod_on_day[a, day] * nprod_on_day[a, day]  <= prodquota[a];

# Production can only be active 22 days of the month
subject to prod_only_active_on_22_days{a in A}:
    sum {day in DAYS} is_prod_on_day[a, day] <= 22;

# activation cost
```

Figure 2: Q2

```
set A := A1 A2 A3;

param maxdemand :=
    A1 5300
    A2 4500
    A3 5400;


param sellingprice :=
    A1 124
    A2 109
    A3 115;

param prodcost :=
    A1 73.30
    A2 52.90
    A3 65.40;

param prodquota :=
    A1 500
    A2 450
    A3 550;

param minbatch :=
    A1 20
    A2 20
    A3 16
```

```
set A;
set DAYS := {1..30};
param maxdemand{i in A};
param sellingprice{i in A};
param prodcost{i in A};
param prodquota{i in A};
param minbatch{i in A};

var is_prod_on_day{A, DAYS} binary;
var nprod_on_day {A, DAYS} integer;

max:
  sum {a in A, day in DAYS}
      is_prod_on_day[a, day] * nprod_on_day[a, day] *
      (sellingprice[a] - prodcost[a]);

# total produce less than max demand
subject to max_demands_per_month {a in A}:
    (sum {day in DAYS}
        is_prod_on_day[a, day] * nprod_on_day[a, day]) <= maxdemand[a];

# produce per day is less than quota
subject to max_quota_per_day {a in A, day in DAYS}:
    is_prod_on_day[a, day] * nprod_on_day[a, day]  <= prodquota[a];

# Production can only be active 22 days of the month
subject to prod_only_active_on_22_days{a in A}:
    sum {day in DAYS} is_prod_on_day[a, day] <= 22;

# Minimum production batch on days production happens
subject to min_prod_batch{a in A, day in DAYS}:
    is_prod_on_day[a, day] * nprod_on_day[a, day] + (1 - is_prod_on_day[a, day]) * 100000 >= min
```

Figure 3: Q3