Optimization assignment — AMPL V₃ 2

Siddharth Bhat(20161105)

March 9, 2019

```
set A;
set DAYS := {1..30};
                                                                                        param maxdemand{i in A};
set A := A1 A2 A3;
                                                                                        param sellingprice{i in A};
                                                                                        param prodcost{i in A};
param activationcost{i in A};
param maxdemand :=
     A1 5300
A2 4500
                                                                                        var is_prod_on_day{A, DAYS} binary;
var nprod_on_day {A, DAYS} integer;
param sellingprice :=
                                                                                           sum {a in A, day in DAYS}
      A1 124
A2 109
                                                                                                 is_prod_on_day[a, day] * nprod_on_day[a, day] * (sellingprice[a] - prodcost[a]) - is_prod_on_day[a, day] * activationcost[a];
      A3 115;
                                                                                        # total produce less than max demand
param prodcost :=
A1 73.30
A2 52.90
                                                                                        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];</pre>
      A3 65.40;
                                                                                        # 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];</pre>
param prodquota :=
     A2 450
A3 550;
                                                                                        # 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;</pre>
```

Figure 1: Q1

```
set A;
                                                                set DAYS := {1..30};
set A := A1 A2 A3:
                                                                param maxdemand{i in A};
                                                                param sellingprice{i in A};
param maxdemand :=
                                                                param prodcost{i in A};
    A1 5300
                                                                param prodquota{i in A};
    A2 4500
                                                                param minbatch{i in A};
    A3 5400;
                                                                var is_prod_on_day{A, DAYS} binary;
                                                                var nprod_on_day {A, DAYS} integer;
param sellingprice :=
    A1 124
    A2 109
                                                                  sum {a in A, day in DAYS}
    A3 115:
                                                                       is_prod_on_day[a, day] * nprod_on_day[a, day] *
(sellingprice[a] - prodcost[a]);
param prodcost :=
    A1 73.30
A2 52.90
                                                                # total produce less than max demand
                                                                subject to max_demands_per_month {a in A}:
    A3 65.40;
                                                                     (sum {day in DAYS}
                                                                         is_prod_on_day[a, day] * nprod_on_day[a, day]) <= maxdemand[a];</pre>
param prodquota :=
                                                                # produce per day is less than quota
    A2 450
                                                                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];
    A3 550:
param activationcost :=
                                                                # Production can only be active 22 days of the month
    A1 170000
                                                                subject to prod_only_active_on_22_days{a in A}:
    A2 1500000
                                                                     sum {day in DAYS} is_prod_on_day[a, day] <= 22;</pre>
    A3 100000
```

Figure 2: Q2

```
set A;
                                                                       set DAYS := {1..30};
                                                                       param maxdemand{i in A};
set A := A1 A2 A3;
                                                                       param sellingprice{i in A};
                                                                       param prodcost{i in A};
param maxdemand :=
                                                                       param prodquota{i in A};
     A1 5300
                                                                       param minbatch{i in A};
     A2 4500
     A3 5400;
                                                                       var is_prod_on_day{A, DAYS} binary;
                                                                       var nprod_on_day {A, DAYS} integer;
param sellingprice :=
    A1 124
A2 109
                                                                          sum {a in A, day in DAYS}
                                                                              is_prod_on_day[a, day] * nprod_on_day[a, day] *
(sellingprice[a] - prodcost[a]);
     A3 115;
param prodcost :=
                                                                       # total produce less than max demand
subject to max_demands_per_month {a in A}:
    A1 73.30
     A2 52.90
                                                                            (sum {day in DAYS}
     A3 65.40;
                                                                                 is_prod_on_day[a, day] * nprod_on_day[a, day]) <= maxdemand[a];</pre>
param prodquota :=
                                                                       # 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];</pre>
    A1 500
     A2 450
     A3 550;
                                                                        # Production can only be active 22 days of the month
param minbatch :=
                                                                       \verb|subject to prod_only_active_on_22_days{a in A}|:
    A1 20
                                                                            sum {day in DAYS} is_prod_on_day[a, day] <= 22;
     A2 20
     A3 16
                                                                        # 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