Homework 7 (50 points) Due: March 20, 2019

COMPSCI 735: OPTIMIZATION: TECHNIQUES AND APPLICATIONS

Formulate the following problems as GAMS (LP) models and solve them. Submit this assignment electronically to Canvas. You should hand in exactly 4 files with the following names: hw7-1.gms, hw7-1.lst. The "lst" files are produced automatically when you execute "gams" model file.

Problem 1:

Lucius and Narcissa Malfoy didn't get to be rich, pureblood, dark wizards without lots of galleons. Their family made their money in the Wizard catering business. As part of the business, their son Draco is responsible for ensuring that they have enough clean napkins to meet demand over a period of n days. The number d_j of napkins required on the jth day is known in advance. To satisfy this requirement, Draco can either buy new napkins for α galleons each, or he can have the napkins laundered. The laundry provides both fast and slow magical cleaning services, In fast service, napkins are returned q days later for a cost of β galleons per napkin, and in slow service, napkins are returned p days laters at a cost of γ dollars per napkin. Natrually, $p > q$, and $\alpha > \beta > \gamma$. Suppose that Draco must plan for a period of $n = 10$ days, and the number of required napkins is given as

```
set T /1*10/ ;
parameter d(T) / 1 50, 2 60, 3 80, 4 70, 5 50, 6 60,
7 90, 8 80, 9 50, 10 100/;
```

Finally, for Draco's instance, we have $p = 4, q = 2, \alpha = 200, \beta = 75$, and $\gamma = 25$.

Formulate Draco's problem as a min cost network flow problem and solve it using GAMS. You *must* model the problem as a min-cost network flow problem. **Hint:** Your network should have 22 nodes in it for Draco's instance. You should display the number of equations using `display modelname.numequ`. Your model should have 23 equations. (Objective= 66750.00)