ASSIGNMENT 1 CHE 4273

Submit all files through learn.ou.edu. Including Simulation files. Make sure they can be opened before you submit. Sometimes students inadvertently submit corrupted files.

DUE: February 12.

PROBLEM #1: *This exercise is for sharpening your optimization skills.*

Suppose a flow problem on a pipe.

F= 50 lbs/sec
ρ =60 lb/ ft^3
μ=6.72 10^{-4} lb/ (ft sec)
η=0.6 (60% pump efficiency).
-8760 h/year of operation
Cost of electricity= \$0.05/ Kwh
Cost of piping (\$/(ft year)) = \$5.7 $[D(ft)]^{1.3}$

Determine the optimal diameters and lengths of two pipes connected sequentially one after the other such that both are 2000 m long and a steady change of altitude of 15 meters. Ignore fittings. For this, you need to construct a total cost expression as a function of diameters and lengths.

Can you get an analytical solution?

How about solver in excel?

PROBLEM #2: *Learning Optimization & GAMS*

An oil refinery has to blend gasoline. Suppose that the refinery wishes to blend four petroleum constituents into three grades of gasoline: *A, B,* and *C*. Determine the mix of the four constituents that will maximize profit.

The availability and costs of the four constituents are given in the following table:

Constituent*	Maximum quantity Available (bbl/day)	Cost Per barrel (\$)
1	3000	13.00
2	2000	15.30
3	4000	14.60
4	1000	14.90

*1 = butane , 2 = straight-run, 3 = thermally cracked, 4 = catalytic cracked

To maintain the required quality for each grade of gasoline, it is necessary to specify certain maximum or minimum percentages of the constituents in each blend. These are shown in the following table, along with the selling price for each grade.

Grade	Specification	Selling price per barrel ($)
A	Not more than 15% of 1 Not less than 40% of 2 Not more than 50% of 3	16.20
B	Not more than 10% of 1 Not less than 10% of 2	15.75
C	Not more than 20% of 1	15.30

Assume that all other cash flows are fixed so that the "profit" to be maximized is total sales income minus the total cost of the constituents. Set up a linear programming model for determining the amount and blend of each grade of gasoline. Use both GAMS and Excel.

(Please remember to close your file before exiting GAMS. If you do not do that, your file will be available to other students to copy, even if you log out. I had 10 incidents of cheating a few years ago because of this temptation. Some people did not graduate in part because of it.)