

ISyE6669 Homework Week 6

Spring 2021

1 Week 6

1. A machine shop has a drill press and a milling machine which are used to produce two parts A and B. The required time (in minutes) per unit part on each machine is shown in the table below.

	Drill press	Milling machine
A	3	4
B	5	3

Table 1: Data for required times in minutes

The shop must produce at least 50 units in total (both A and B) and at least 30 units of part A, and it can make at most 100 units of part A and 100 units of part B. You can assume that the shop can make fractional amount of the parts. Formulate an LP to minimize the absolute difference between the total running time of the drill press and that of the milling machine. You need to define clearly the meaning of the variables that you use in the LP. Finally, you need to implement your model in CVXPY and print out the optimal solution and objective value.

2. I am a retailer of suitcases. I can purchase suitcases from two suppliers. Supplier 1 sells one suitcase for \$10. Supplier 2 sells suitcases in the following fashion:
 - (a) It is a fixed cost of \$1200 for purchasing 100 or less suitcases. (Assume that Supplier 2 charges \$1200 even if no suitcases are purchased from supplier 2.)
 - (b) For each suitcase more that 100 suitcases purchased, there is an additional charge of \$5 per suitcase.

I want to buy 500 suitcases. Formulate a linear program to minimize the total cost of my purchase. You should treat the number of suitcases as a continuous variable. You need to define clearly the meaning of the variables that you use. Finally, implement and solve your LP in CVXPY and print out the optimal solution and objective value.

Hint: You may encounter a nonlinear function involving the maximum function. But you can reformulate such nonlinear function using linear constraints.