Lesson 10/11 HW: Combinatorial Optimization Models

ITSD is attempting to backup data on some external harddrives and have asked you for help. The data files have sizes 240, 462, 117, 560, 379, 110, 341, 294, 503, 469, 90, 65, 617, 500, 550, and 400 GB.

a) If the capacity of a harddrive is 780 GB, write a concrete integer programming model to determine the minimum number of harddrives needed to backup all files. *Hint: You need two types of variables. One is a $x_{f,h}$ variable to which equals 1 if a file is assigned to a harddrive. The other is a z_h which equals 1 if that harddrive is used. Make sure you include logical constraints to relate these variables.*

b) Convert your concrete model to a parameterized model.

c) How many total variables does your model have?

d) **Optional:** Implement your model in Python. You may have to start with a smaller number of harddrives and gradually increase. This is an interesting example of how for even a "small" problem, a solver can be slowed down with some difficult constraints/variables.