

3.3 – Applications of Linear Programming

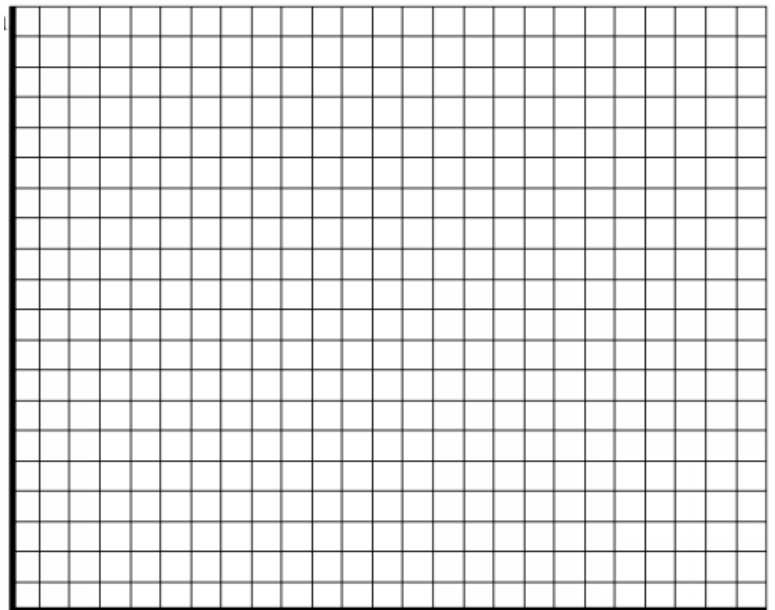
#1.

Revenue A machine shop manufactures two types of bolts. The bolts require time on each of the three groups of machines, but the time required on each group differs, as shown in the table below.

	Type I	Type II
Machine 1	0.2 min	0.2 min
Machine 2	0.6 min	0.2 min
Machine 3	0.04 min	0.08 min

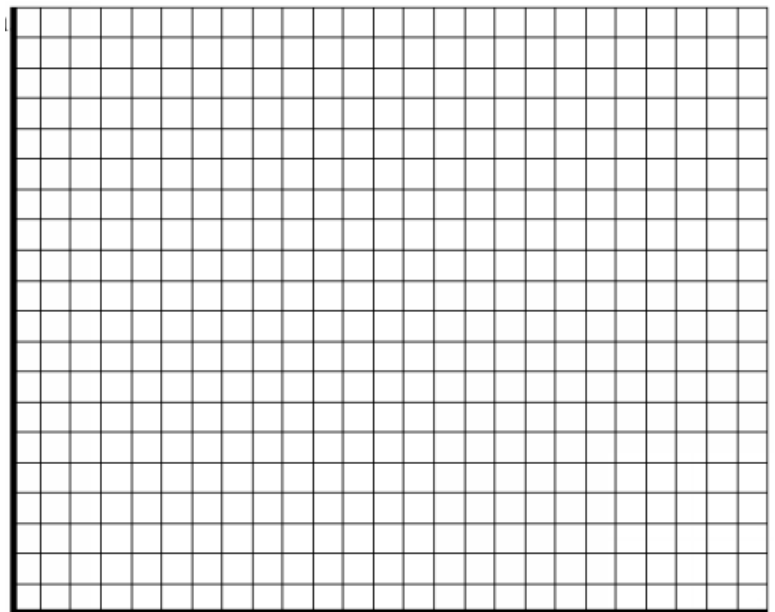
Production schedules are made up one day at a time. In a day, 300, 720, and 100 minutes are available, respectively, on these machines. Type I bolts sell for 15¢ and type II bolts for 20¢.

- a. How many of each type of bolt should be manufactured per day to maximize revenue?
- b. What is the maximum revenue?
- c. Suppose the selling price of type I bolts began to increase. Beyond what amount would this price have to increase before a different number of each type of bolts should be produced to maximize revenue?



#2.

Transportation A manufacturer of refrigerators must ship at least 100 refrigerators to its two West Coast warehouses. Each warehouse holds a maximum of 100 refrigerators. Warehouse A holds 25 refrigerators already, and warehouse B has 20 on hand. It costs \$12 to ship a refrigerator to warehouse A and \$10 to ship one to warehouse B. Union rules require that at least 300 workers be hired. Shipping a refrigerator to warehouse A requires 4 workers, while shipping a refrigerator to warehouse B requires 2 workers. How many refrigerators should be shipped to each warehouse to minimize costs? What is the minimum cost?



#3.

Predator Food Requirements A certain predator requires at least 10 units of protein and 8 units of fat per day. One prey of species I provides 5 units of protein and 2 units of fat; one prey of species II provides 3 units of protein and 4 units of fat. Capturing and digesting each species-II prey requires 3 units of energy, and capturing and digesting each species-I prey requires 2 units of energy. How many of each prey would meet the predator's daily food requirements with the least expenditure of energy? Are the answers reasonable? How could they be interpreted?

