

Homework 1

Due Nov 29, 2023 (Friday by class time 1pm)

Formulate an optimization model and solve it using Excel solver.

1) Aire-Co' dehumidifiers:

Aire-Co produces home dehumidifiers at two different plants in Atlanta and Pheonix. The per unit cost of production in Atlanta and Pheonix is \$400 and \$360, respectively. Each plant can produce a maximum of 300 units per month. Inventory holding costs are assessed at \$30 per unit in beginning inventory each month. Aire-Co estimates the demand for its products to be 300, 400 and 500 units, respectively, over the next three months. Aire-Co wants to be able to meet this demand at minimum cost.

2) Investment Plan

A bank has \$650,000 in assets to allocate among investments in bonds, home mortgages, car loans, and personal loans. Bonds are expected to produce a return of 10%, mortgages 8.5%, car loans 9.5%, and personal loans 12.5%. To make sure the portfolio is not too risky, the bank wants to restrict personal loans to no more than 25% of the portfolio. The bank also wants to ensure that more money is invested in mortgages than personal loans. They also want to invest more in bonds than personal loans.

3) Weedwacker Company's lawn trimmers

The Weedwacker Company manufactures two types of lawn trimmers: an electric model and a gas model. The company has contracted to supply a national discount retail chain with a total of 30,000 electric trimmers and 15,000 gas trimmers. However, Weedwacker's production capability is limited in three departments: production, assembly, and packaging. The following table summarized the hours of processing time available, and the processing time required by each department, for both types of trimmers:

	Hours required per trimmer		Hours Available
	Electric	Gas	
Production	0.2	0.4	10,000
Assembly	0.3	0.5	15,000
Packaging	0.1	0.1	5,000

The company makes its electric trimmer in-house for \$55 and its gas trimmer for \$82/ Alternatively, it can buy electric and gas trimmers from another source for \$67 and \$95, respectively. How many gas and electric trimmers should Weedwacker make and how many should it buy from its competitor in order to fulfill its contract in the least costly manner?

4) Electrotech Corporation's profit

The Electrotech Corporation manufactures two industrial-sized electrical devices: generators and alternators. Both products require wiring and testing during the assembly process. Each generator requires 2 hours of wiring and 1 hour of testing and can be sold for a \$250 profit. Each alternator requires 3 hours of wiring time and 2 hours of testing and can be sold for a \$150 profit. There are 260 hours of wiring time and 140 hours of testing time available in the next production period and Electrotech wants to maximize profit.