

**FOR 240 Lab 4 Assignment**  
**Using Excel Solver to Solve a Linear Model of Forest Management**  
**Introduction to Computing in Natural Resources**

In this lab, you need to define a linear model and solve it using the Excel solver. Here is the description of the problem: A forest products company in north-western Pennsylvania is planning to harvest forest from its own land. Its timber inventory is dispersed over 3 stands and consists mainly of **black cherry, red maple, and red oak**. The company owns and operates a large sawmill, producing about 15,000 thousand board feet (MBF) annually. About 25% of the mill's timber requirements come from the company's land.

Please provide the company a detailed management plan about how many board feet of timber by species should be harvested from each stand in order to maximize the total value derived from timber sale while satisfying the mill's annual demand for timber. The timber prices by species and timber inventory in the three stands are presented in Table 1.

Hint: **Decision variables:** Let  $X_{ij}$  be the volume of species  $i$  harvested from stand  $j$ . Species  $i=1,2,3$ , where 1=Black Cherry, 2=Red Maple, 3=Red Oak; Stand  $j=1,2,3$ . Therefore, you need to define  $3 \times 3$  decision variables.

**Objective:** maximize the total value derived from timber sale.

- Constraints:** (1) Sawmill demand (1 constraint)  
 (2) Timber inventory by species and stand (9 constraints)  
 (3) Non-negative constraints for all the variables (9 constraints)

Table 1. Total stand volume by species.

		Stand No.		
		1	2	3
Species	Value (\$/MBF)	-----MBF-----		
Black Cherry	596	339	9	456
Red Maple	163	322	100	529
Red Oak	233	202	73	1933

Please provide me a summary report with your linear model and the solution using Excel solver. This assignment is due by the beginning of the class next week (10 points).

Set up your excel file like this and then add your constraints in the excel solver.

