Exercise 15.5-6

Problem: A fruit stand vendor buys boxes of fruit from a grower. He may sample one piece of fruit before accepting or rejecting a box.

Questions:

(1) Should he continue buying from this grower?
(2) If so, is it worthwhile to continue sampling from each box?
(3) If so, should he be accepting or rejecting the box based on this one sample?

Data: About 90% of boxes of fruit from this grower are satisfactory, i.e., typically contain 80% excellent fruit that will earn about $200 profit. Unsatisfactory boxes contain about 30% excellent fruit and will produce a loss of $1000.

Solution. Let's proceed in steps:

(1) Describe the relevant "states of nature" and alternatives for this problem.
(2) Make out tables that describe probabilities and payoffs of this problem.
(3) Set up a decision tree for this problem in Excel.
(4) Solve the problem in steps, factoring in EVPI and EVE.
(5) Do a sensitivity analysis.

Postscript

The more I think about it, the more ridiculous these numbers look. So let's reformulate the problem more generically and and with a twist.

N3: A retailer buys a certain product from a vendor packaged in boxes with a fixed number of units per box. She may test one randomly selected unit before accepting or rejecting a box. Perform a decision analysis on this problem. You may use Excel or do it by hand. Clearly identify the appropriate variables, events, states, and relevant probabilities. Then answer these questions.

(1) Should she continue buying from this vendor?
(2) If so, is it worthwhile to continue sampling from each box?
(3) If so, should she be accepting or rejecting the box based on this one sample?
(4) At an additional cost of $20, the buyer can sample an extra item after sampling the first. Is it worth it? Find the highest additional cost (if any) at which it would be worth it to sample an extra item.

Data: About 90% of boxes from this grower are satisfactory, i.e., typically contain 80% excellent units that will earn about $200 profit. Unsatisfactory boxes contain about 30% excellent units and will produce a loss of $400. The

number of units per box is large enough that there is negligible difference in quality if one item is removed. Rejection of a box carries a penalty of \$30 charged by the supplier for handling expenses.