Case Study: Sea Crest B&B

The Sea Crest Bed and Breakfast sits on 5 beautiful acres located on the coast of Northern California. Unfortunately, a sequence of financial disasters has forced the Crest family to sell the business in a bankruptcy proceeding. An appraisal of the business suggests that it is worth $2,500,00 in today's market. They have decided to attempt to sell the business on their own and have hired a consultant to manage the process of soliciting offers. The consultant costs them $20,000 per month and generates one solid offer each month. The consultant works on a month-to-month basis and will not be paid after a sale has been made as he receives commission by the buyers then (regardless of when the sale happens).

There is some uncertainty about the size of offers that the consultant might uncover. The family believes that possible offers are 1, 2, 3, 4, 5 or 6 million Dollars with a probability of 1/6 each. Each month's offer is good for the month in which it is made, offers in different months are independent, and an offer that is rejected cannot be accepted at a later time. If the Crest family has not accepted an offer after 10 months, then they will receive 1 million for the property.

Each month, the Crest family will receive exactly one offer for the business. If they accept the offer, then the offer solicitation process terminates and the business is sold. If they reject the offer, then they will continue soliciting offers for another month (at a cost of $20,000). If no sale has occurred after the tenth month, then the business will be sold for one million. The problem for the family is to decide which offers to accept. The Crest family has asked you to help them think through this problem.

Questions

1. Formulate the decision problem as a finite-horizon Markov Decision Process. Determine the components: N, $\mathbb{X}$, $\mathbb{A}$, p, r, V_N, α .
2. Formulate the optimality equations.
3. Determine the optimal policy using GAMS. Hint: Adapt the Stopping Problem Code.
4. Suppose that the family agrees to accept the first offer of $3 million dollars or more (or 1 million if the first 10 offers were unacceptable). Develop a simulation to estimate the expected value and the standard deviation of the net proceeds (selling price less the cost of the consultant). Use a sample size of 500.

   Use: Excel Table “171023_Case3_SeaCrest_Template” , sheet “SimulateSeacrest”
5. Calculate a 95% confidence interval for the expected net proceeds you obtained.
6. Some members of the Crest family argue that $3 million is too low, since even the expected value of one month is higher than that. This part of the family believes that no offer less than $4.5 million should be accepted. Use your simulation to help them estimate the expected net proceeds and standard deviation of net proceeds for this proposed decision rule.
7. What would you advise the Crest family to do? Compare your GAMS solution to the solution path in “BestDecisions”. Compare the simulation results to task 4 and 6.