

**OPRE 6398 Prescriptive Analytics
Solutions to Homework 7**

2. (1) The payoff matrix is shown below, where all payoffs are in thousands of dollars:

	Win	Loss
Half	480	70
Entire	260	260

(2)	Win	Loss	Maximin	Maximax
Half	480	70	70	<u>480</u>
Entire	260	260	<u>260</u>	260

- (a) Based on the maximin criterion, Larry should sell the entire business since $260 > 70$.
- (b) Based on the maximax criterion, Larry should sell half of his business since $480 > 260$.
- (c) The regret matrix is as follows:

	Win	Loss	Minimax
Half	0	190	<u>190</u>
Entire	220	0	220

Based on the minimax regret criterion, Larry should sell half of his business since $190 < 220$.

- (3) The payoff matrix and the probabilities of occurrence of the states of nature are given below:

	Win	Loss
Half	480	70
Entire	260	260
	0.35	0.65

- (a) Based on the MO criterion, Larry should sell the entire business since $0.65 > 0.35$ and $260 > 70$.
- (b) Half: $EV = 0.35(480) + 0.65(70) = 213.5$
Entire: $EV = 0.35(260) + 0.65(260) = 260$

Based on the EV criterion, Larry should sell the entire business since $260 > 213.5$.

- (c) The regret matrix and the probabilities of occurrence of the states of nature are as follows:

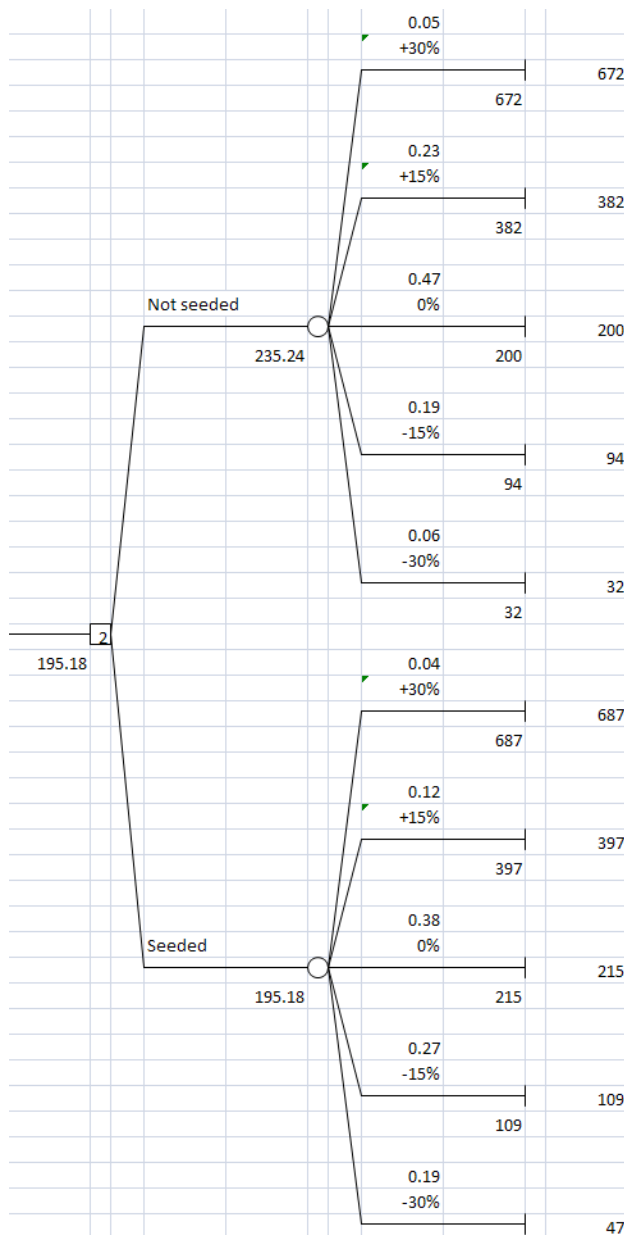
	Win	Loss
Half	0	190
Entire	220	0
	0.35	0.65

Half: $ER = 0.35(0) + 0.65(190) = 123.5$
Entire: $ER = 0.35(220) + 0.65(0) = 77$

Based on the ER criterion, Larry should sell the entire business since $77 < 123.5$.

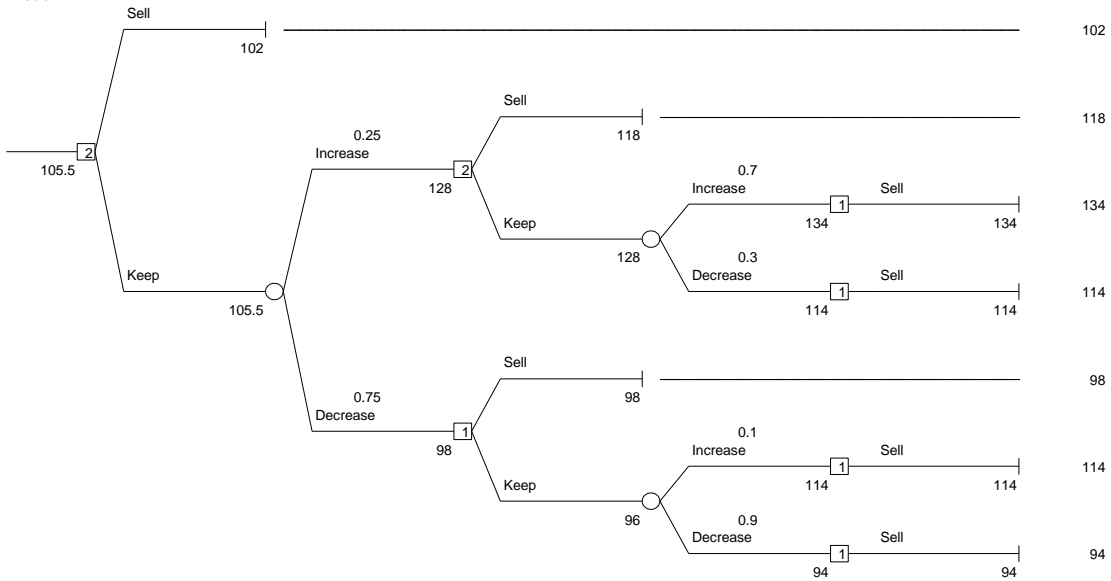
- (4) Based on the payoff matrix, we see that the expected payoff with perfect information is $0.35(480) + 0.65(260) = 337$. However, as shown in Part (3) above, the expected payoff based on the EV criterion is 260. It follows that the $EVPI = |337 - 260| = 77$ or \$77,000. Since $\$71,000 < \$77,000$, John should accept the offer from Mary.

3. We see from the following decision tree that Hurricane Irene should be seeded and the expected minimum damage will be a loss of \$195.18 million.



4. We see from the following decision tree, where all of the payoffs are in thousands of dollars, that Mary should keep the apartment building for now. If the value increases in the first year, she should keep it for another year and then sell it at the beginning of the third year regardless of the value change in the second year. If the value decreases in the first year; however, she should sell it at the beginning of the second year. The expected maximum total revenue is \$105,500.

Problem 2.2



5. One sees from the decision tree below, where all of the payoffs are in thousands of dollars, that Ponderosa should test market the record in the local region. If the result is favorable then the tape should be promoted nationally. If the result is unfavorable, however, then the tape should be abandoned. The expected maximum profit is \$16,500.

