

Math 180 Homework #1
Due Wednesday, September 11

1. You require new land for your business. There are two parcels of land that would be suitable. Property A is being offered at \$300,000 and Property B is being offered at \$250,000. However, Property B may have an environmental problem due to waste that has been dumped on it. No problem is associated with Property A. If the waste is hazardous, and you purchase Property B, you would be required to pay \$200,000 for clean-up. You figure that there is a 50% chance that the waste is hazardous. Before you make any purchase, you can have an environmental testing firm definitively determine whether the waste is hazardous. This would cost you \$20,000.
 - (a) Draw a decision tree outlining the decisions being made in the above scenario.
 - (b) What decision(s) provide the best expected value?
 - (c) What is one scenario where you might opt against the decision(s) outlined in part (b)?

2. You are considering buying some insurance against a potential loss of \$20,000. You expect there is a 30% chance that you will suffer the loss. What is the most amount of money you should pay for insurance? (Explain your answer in words, or answer using a decision tree.)

3. An orange grower in Florida faces a dilemma. The weather forecast is for cold weather, and there is a 50% chance that the temperature tonight will be cold enough to freeze and destroy his entire crop, which is worth \$50,000. To try to alleviate his loss if the temperature drops, he can do one of two things: First, he could set burners in the orchard; this would cost \$5,000, but he could still expect to incur damages of \$15,000 to \$20,000. Second, he could set up sprinklers to spray the trees. If the temperature drops, the water would freeze on the fruit and provide some insulation. This method is cheaper (\$2,000) but less effective, and he could expect to incur as much as a \$25,000 to \$30,000 loss if the freeze occurs.
 - (a) Draw a decision tree for this situation. Note that you will need to modify things slightly to account for a range of values, such as 15,000 to 20,000.
 - (b) Compare the grower's expected values for the three alternatives he has, considering the various loss scenarios for the burners and sprinklers.
 - (c) Solve the decision tree, then answer the question: which alternative would you suggest the grower take?