**Colorado Technical University**

**Course:** MATH366 – Probability and Statistics

#### Unit 8 Part 16 Readings: Decision Trees and Probability

**Decision Trees**

show possible outcomes to aid decision making

Are simple to understand and interpret

People are able to understand decision tree models after a brief explanation

Have value even with little hard data

Important insights can be generated based on experts describing a situation

(its alternatives, probabilities, and costs) and their preferences for outcomes

Possible scenarios can be added

Worst, best and expected values can be determined for different scenarios

Probabilities of various scenarios can be included to help in the decision process

Disadvantages of decision trees:

Decision trees are biased in favor of those attributes with more levels

Calculations can get very complex particularly if many values are uncertain and/or if

many outcomes are linked

Mathematically, trees must have connected branches and they must not form a circuit

Steps to create a decision tree:

1. Clearly define the problem
2. List all possible alternatives
3. Identify scenarios for each alternative
4. Identify the likelihood/probability of each scenario
5. Identify the outcome for each alternative and scenario
6. For financial trees, calculate “Expected Monetary Value” (EMV) using profit and probability values

Each branch of the tree is an alternative decision

Each sub-branch of the tree is a possible scenario

The “leaves” are the possible outcomes

The probability of a given outcome will be the sum of the probabilities for the various

scenarios leading to that outcome

Multiply each profit value by its probability to calculate the “Expected Monetary Value” EMV

Comparison of the EMV values for each alternative will provide useful information in the

decision-making process