Why Use Them?

➢ Tree diagrams provide a useful device for determining probabilities of combined outcomes in a sequence of experiments.

Tree Diagram

➢ A tree diagram helps us represent the various events and their associated probabilities. The various outcomes of each experiment are represented as branches emanating from a point. Each branch is labeled with the probability of the associated outcome.

➢ For example:

![Tree Diagram Example 1](image1)

Tree Diagrams

➢ We represent experiments performed one after another by stringing together diagrams of the sort given in the previous slide. The probabilities for the second set of branches are conditional probabilities given the outcome from which the branches are emanating.

Medical Example

➢ The reliability of a skin test for active pulmonary tuberculosis (TB) is as follows: Of people with TB, 98% have a positive reaction and 2% have a negative reaction; of people free of TB, 99% have a negative reaction and 1% have a positive reaction. From a large population of which 2 per 10,000 persons have TB, a person is selected at random and given a skin test, which turns out positive. What is the probability that the person has active TB?

![Tree Diagram Example 2](image2)
Quality Control Example

A box contains 5 good light bulbs and 2 defective ones. Bulbs are selected one at a time (without replacement) until a good bulb is found. Find the probability that the number of bulbs selected is (a) 1 (b) 2 (c) 3.

Example 1

- A training program is used by a corporation to direct hires to appropriate jobs. The program consists of two steps. Step I identifies 30% as management trainees, 60% as non-managerial workers, and 10% to be fired. In step II, 75% of the management trainees are assigned to managerial positions, 20% are assigned to non-managerial positions, and 5% are fired. In step II, 60% of the non-managerial workers are kept in the same category, 10% are assigned to management positions, and 30% are fired. What is the probability that a randomly chosen hiree will be assigned to a management position at the end of the training period?

Example 2

- Three-fifths of kindergarten children are bussed to school, while two-fifths of the first to fifth graders are bussed. The school has grades K through 5, and 17.5% of the students are in kindergarten. Determine the probability that a child chosen at random from the school is bussed to school.

Example 4

- A light bulb manufacturer knows that .12% of all bulbs manufactured are defective. A testing machine is 99% effective. If a randomly selected light bulb is tested and found to be defective, what is the probability that it actually is defective?