Probability and Statstics

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Textbooks

❑ **Probability & Statistics for Engineers & Scientists**, Ninth Edition, Ronald E. Walpole, Raymond H. Myer

❑ **Elementary Statistics: Picturing the World,** 6th Edition, Ron Larson and Betsy Farber

❑ **Elementary Statistics**, 13th Edition, Mario F. Triola

Reference books

❑ **Probability Demystified**, Allan G. Bluman

❑ **Schaum's Outline of Probability and Statistics**

❑ **MATLAB Primer**, Seventh Edition

❑ **MATLAB Demystified** by McMahon, David

References

Readings for these lecture notes:

❑ **Schaum's Outline of Probability, Second Edition (Schaum's Outlines)**
  by Seymour Lipschutz, Marc Lipson

❑ **Probability & Statistics for Engineers & Scientists**, Ninth Edition, Ronald E. Walpole, Raymond H. Myer

These notes contain material from the above resources.

Finite Stochastic Processes And Tree Diagrams

❑A (finite) sequence of experiments in which each experiment has a finite number of outcomes with given probabilities is called a **(finite) stochastic process**.

❑A convenient way of describing such a process and computing the probability of any event is by a **tree diagram.**

Example:

We are given three boxes as follows:

Box 1 has **10** light bulbs of which **4** axe defective.

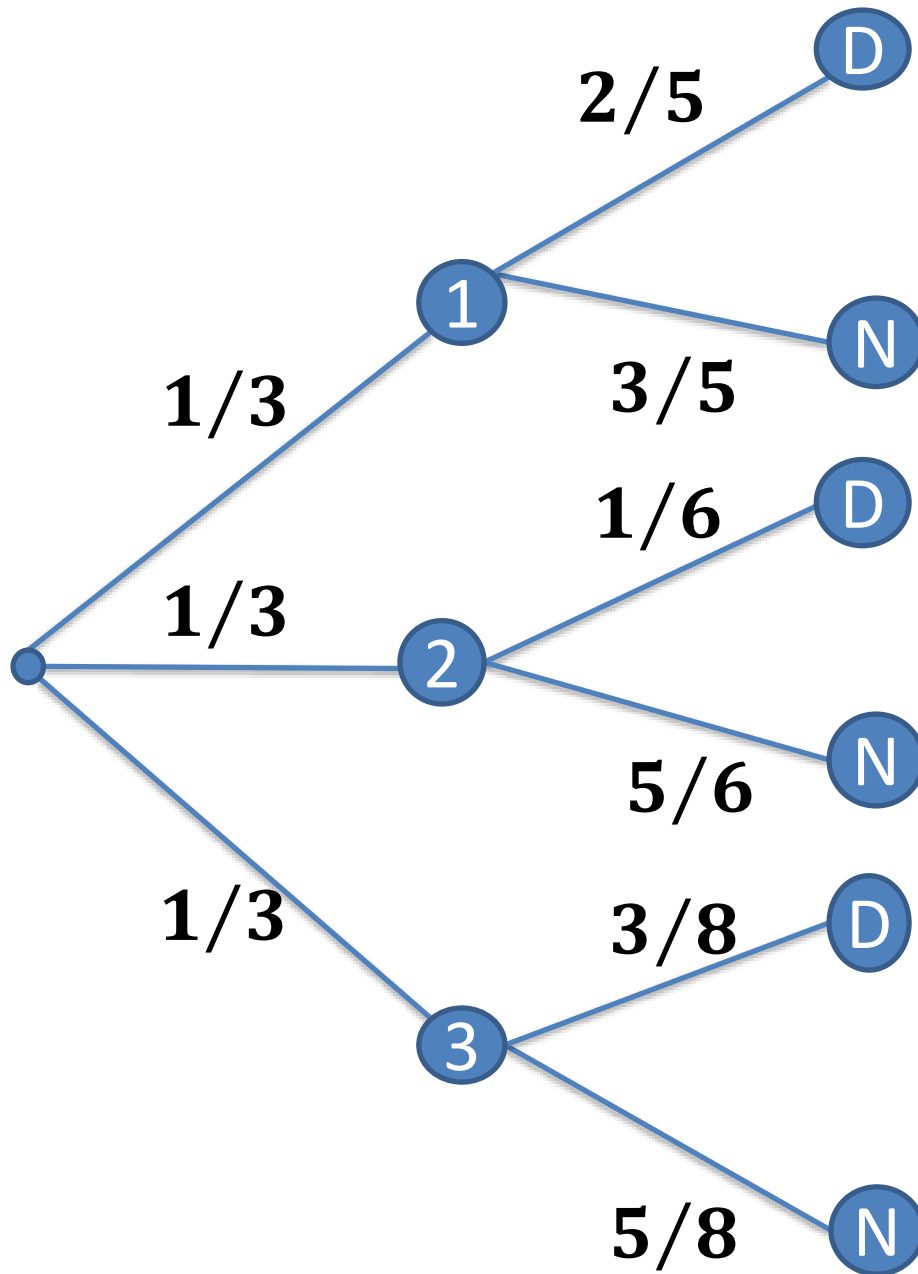**Box 2** has **6** light bulbs of which **1** is defective.

Box 3 has **8** light bulbs of which **3** are defective.

We select a box at random and then draw a bulb at random. What is the probability **p** that the **bulb** is **defective**?

Solution:

Here we perform a sequence of two experiments:

(i) select one of the three boxes;

(ii) select a bulb which is either defective *(D)* or nondefective *(N).*

Thus by the multiplication theorem,

$$\mathbf{p} = (\frac{1}{3})(\frac{2}{5}) + (\frac{1}{3})(\frac{1}{6}) + (\frac{1}{3})(\frac{5}{8}) = \frac{113}{360}$$

Example : A coin, weighted so that **P(H) =** $\frac{2}{3}$ and **P(T) =** $\frac{1}{3}$**,** is tossed. If **heads** appears, then a number is selected at random from the numbers **1 through 9**; if **tails** appears, then a number is selected at random from the numbers **1 through 6.**

Find the probability p that an **even number** is selected.
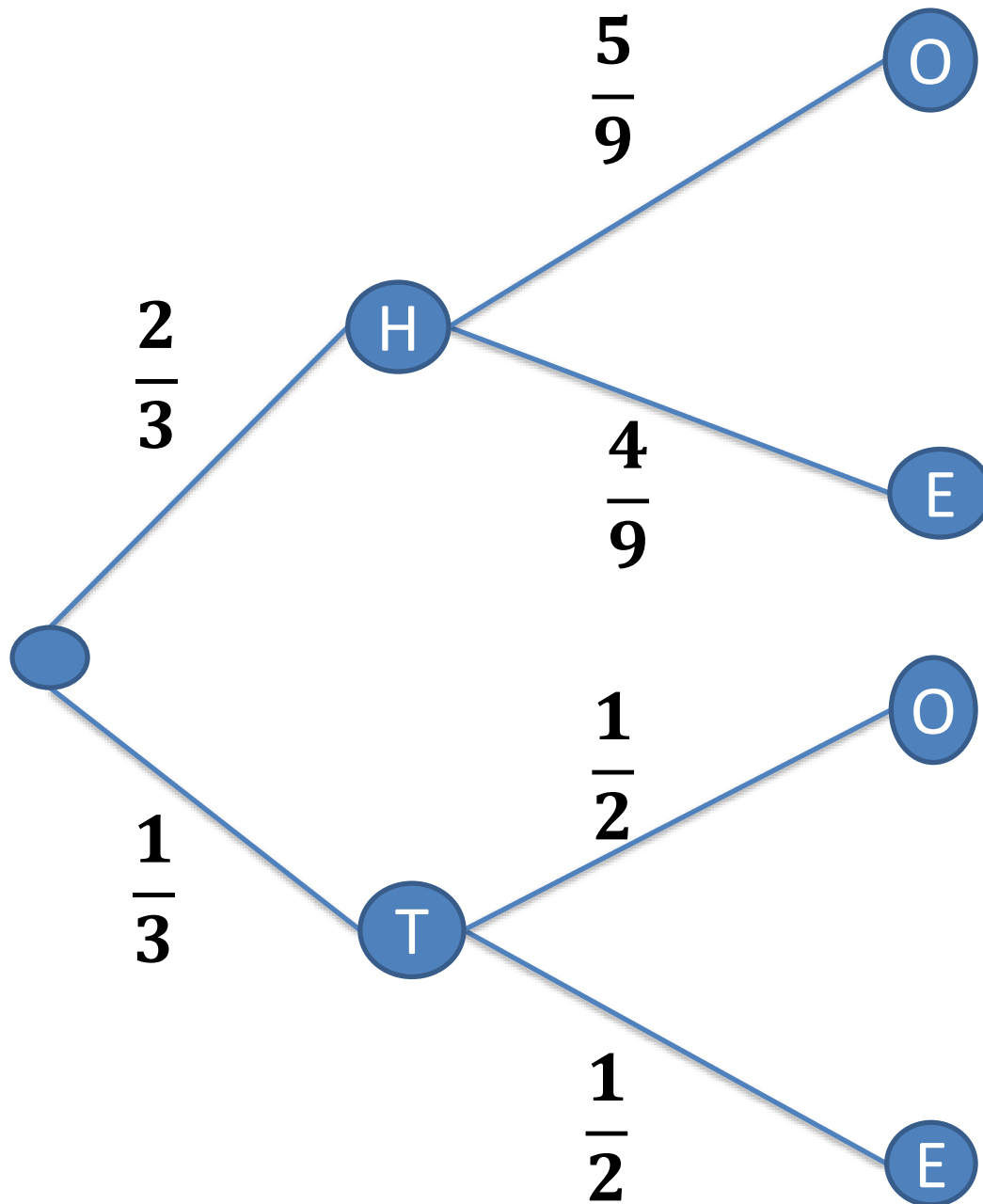
Probability of even using 1 through 9:

$P(E) = \dfrac{4}{9}$

Probability of even using 1 through 6:

$P(E) = \dfrac{3}{6} = \dfrac{1}{2}$

$\mathbf{p} = \left(\dfrac{2}{3}\right)\left(\dfrac{4}{9}\right) + \left(\dfrac{1}{3}\right)\left(\dfrac{1}{2}\right) = \dfrac{25}{54}$