

# DISCRETE STRUCTURE & APPLICATIONS

## BUM1433

### BASIC COUNTINGS

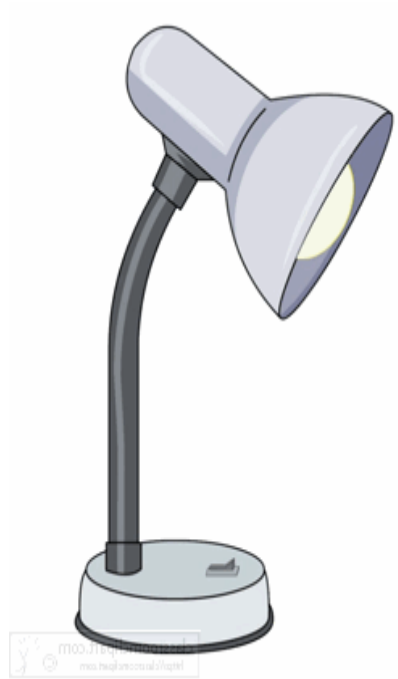
#### 1.4 Tree Diagram



By:

MS NURFATIAH MOHAMAD HANAFI  
PM DR YUHANI YUSOF  
CENTRE FOR MATHEMATICAL SCIENCES

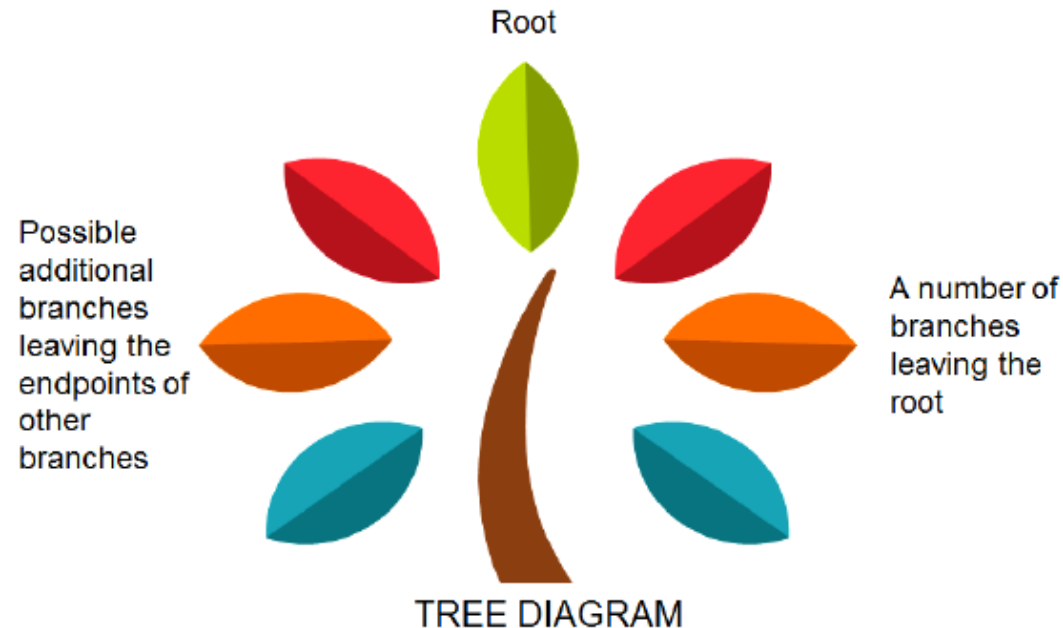
# Objectives



Solve counting problems  
using tree diagram.

# Introduction

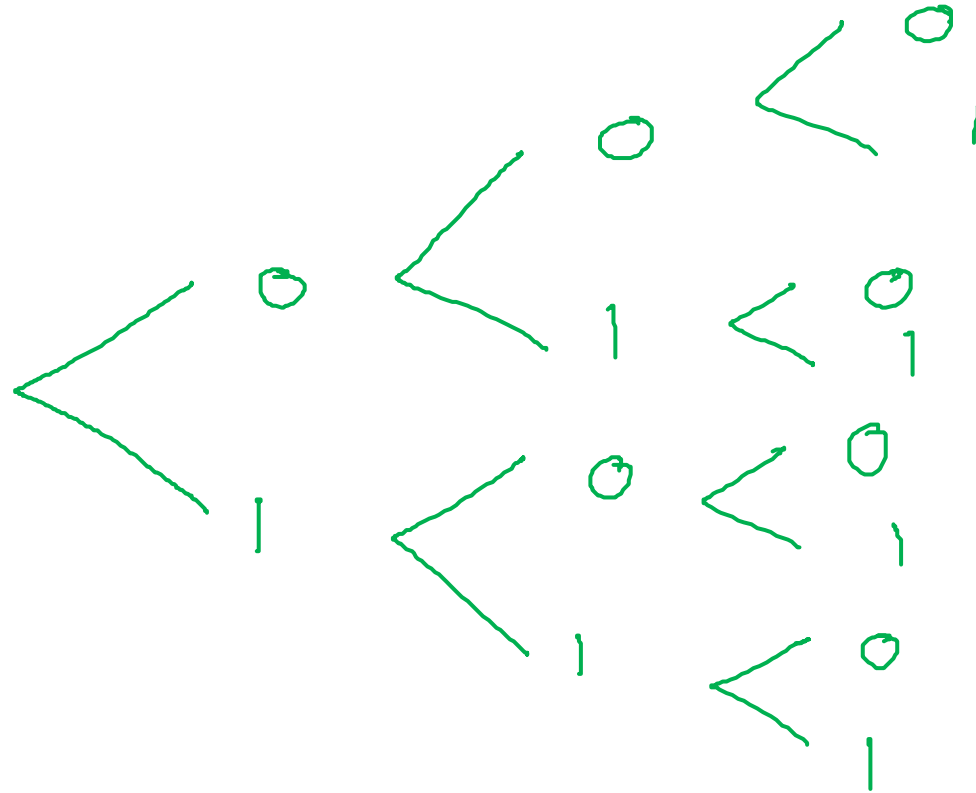
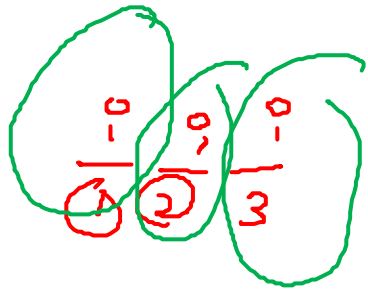
Counting problems can also be solved by using a tree diagram technique. The elements contain in tree diagram are illustrated as below.



We use **branch** to represent each **possible choice**. The **leaves** are used to represent the **possible outcomes** which are the **endpoints** of the branches not having another branch.

**Solution:**

bit string  $< 0$



00010101101111

5

#

## Example 2:

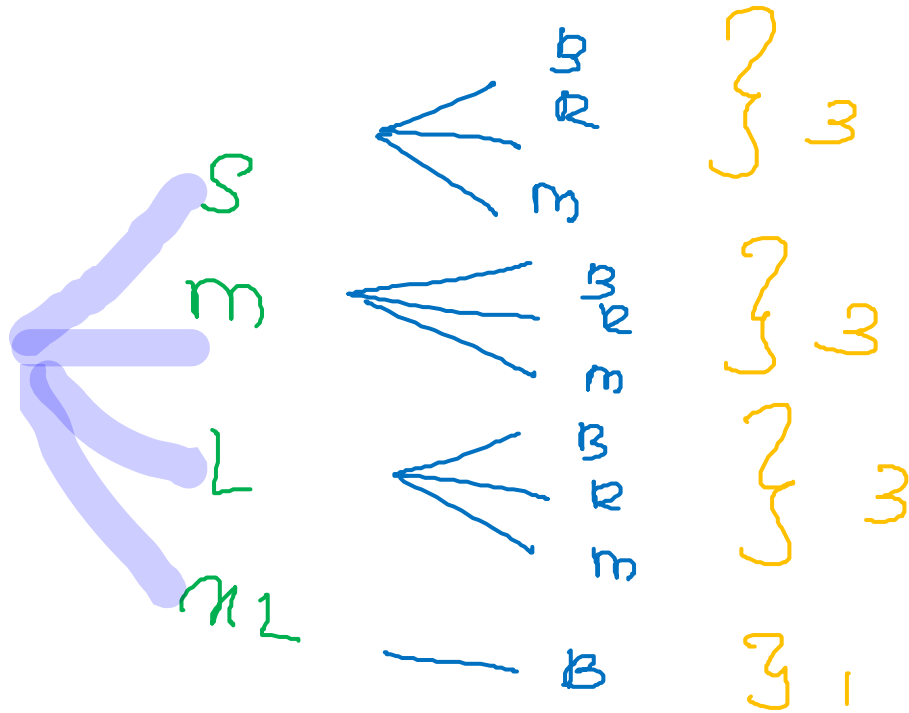
A playoff between two teams consists of at most five games. The first team that wins three games wins the playoff. In how many different ways can the playoff occur?

Solution:

### Example 3:

Suppose the pyjamas come in four different sizes which are S, M, L and XL. Each size comes in three different colours which are blue, red and magenta except XL size which comes only in blue colour. How many different pyjamas does the boutique owner have to restock to have at least one of each size and colour of the pyjamas?

Solution:



$$3 + 3 + 3 + 1 = 10 \#$$

# Exercises

1. Four coins are tossed and the outcomes are placed in a row. How many outcomes contain at least two consecutive heads?
2. Find the number of bit strings of length 4 with no three consecutive 0s.
3. Teams  $A$  and  $B$  are to play each other repeatedly until one wins two games in a row or a total of three games. One way in which this tournament can be played is for  $A$  to win the first game,  $B$  to win the second, and  $A$  to win the third and fourth games. Denote this by writing  $A-B-A-A$ . How many ways can the tournament be played?
4. Suppose that “FSKKP” tee shirts come in five different sizes: S, M, L, XL, and XXL. Further suppose that each size comes in four colors, white, red, green, and black, except for XL, which comes only in red, green, and black, and XXL, which comes only in green and black. How many different shirts does a souvenir shop have to stock to have at least one of each available size and color of the tee shirt?

THANK  
YOU