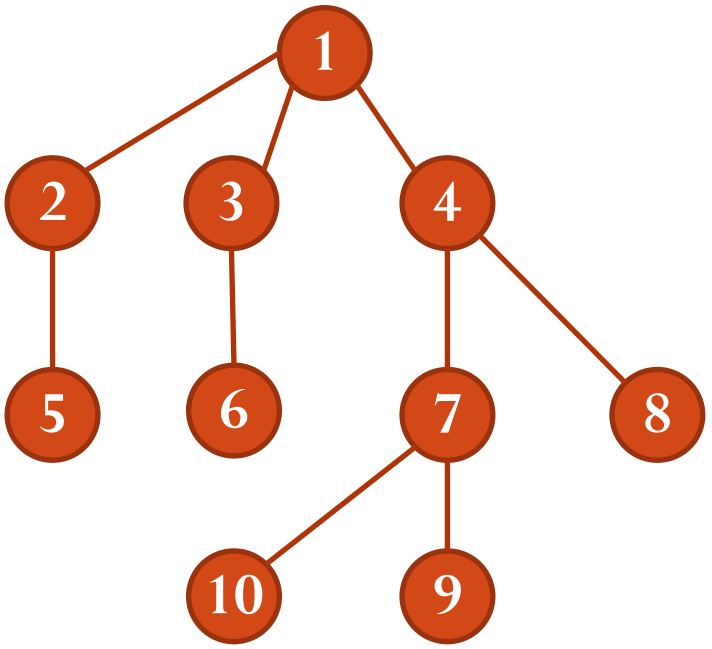
TREES

- Objective
  - Practice with general tree data structure
  - Implement typical operators on trees

EXERCISE 10: Network analysis

- A communication network is organized as a tree structure
- A path on the network: sequence of nodes x_1, x_2, . . ., x_K such that xi is the parent of x_{i+1} (i = 1, 2, …, K-1). The length of that path is K
- The height of a node: length of the longest path from that node to some leaf
- The depth of a node: length of the unique path from the root that that node



- Length of path 1 – 2 – 7 – 10 is 4
- Height (4) = 3
- Depth (4) = 2

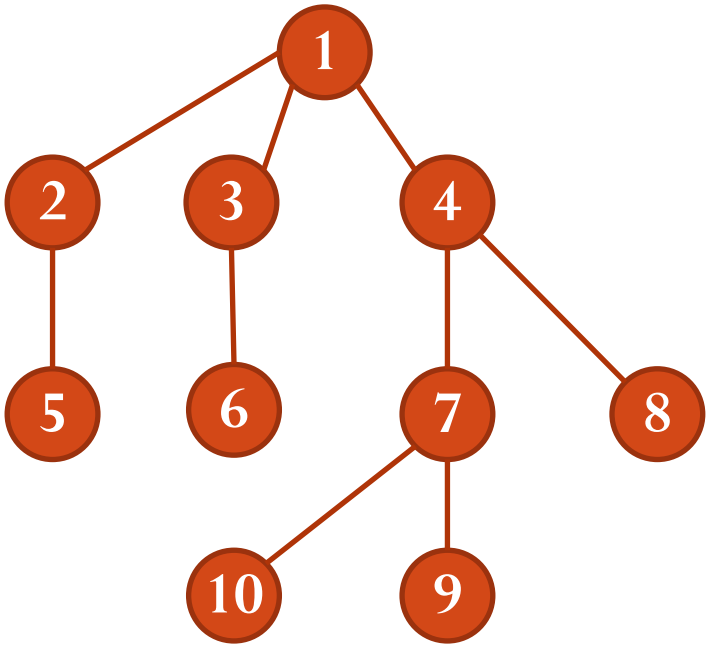
EXERCISE 10: Network analysis

- Name of program: NETWORKD
- Objective: compute the sum of depths of all nodes of a given network
- Input
  - Each line contains: u, k, x_1, x_2, . . ., x_k in which x_1, x_2, …, x_k are children of node u from left to right
  - The input is terminated with a line containing -1
- Output
  - Contains unique number which is the sum of depths of all nodes of the given network

EXERCISE 10: Network analysis

- Name of program: NETWORKD
- Objective: compute the sum of depths of all nodes of a given network
- Example

stdin	stdout
1 3 2 3 4 2 1 5 3 1 6 4 2 7 8 7 2 10 9 -1	27



EXERCISE 10: Network analysis

- Name of program: NETWORKH
- Objective: compute the sum of heights of all nodes of a given network
- Input
  - Each line contains: u, k, x_1, x_2, . . ., x_k in which x_1, x_2, …, x_k are children of node u from left to right
  - The input is terminated with a line containing -1
- Output
  - Contains unique number which is the sum of heights of all nodes of the given network

EXERCISE 10: Network analysis

- Name of program: NETWORKD
- Objective: compute the sum of depths of all nodes of a given network
- Example

stdin	stdout
1 3 2 3 4 2 1 5 3 1 6 4 2 7 8 7 2 10 9 -1	18