trees

tree = connected, undirected graph with no simple circuits
forest = multiple trees that are not connected to each other

* there is a unique simple path between any two of tree's vertices

rooted tree: one vertex has been designated as the root
unrooted tree: can be converted into different rooted trees

ancestor: ata
descendant: torun, ogul

leaf: a vertex with no children
internal vertex: vertices that have children

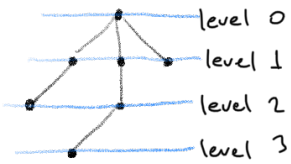
m-ary tree = every internal vertex has no more than m children
↳ full m-ary tree = every internal vertex has exactly m children.


are both full

• complete = full tree, all leaves at the same dept.

ordered tree = the children of each internal vertex are ordered

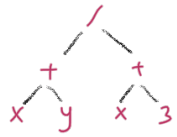
* a tree with n vertices has n-1 edges.
→ in full m-ary tree: $n = m \cdot i + 1$ (i = internal vertices) → $i = \frac{n-1}{m}$
balanced tree = all the leaves are at levels h or h-1.
* max number of leaves: m^h, max height: $\log_m l$ (l = leaves)



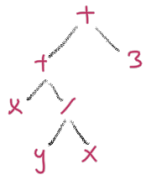
height of the tree: 3

inorder traversal = n-k-o-p

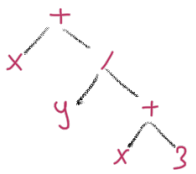
Expression trees



(x+y) / (x+3)



(x + (y/x)) + 3



x + (y / (x+3))

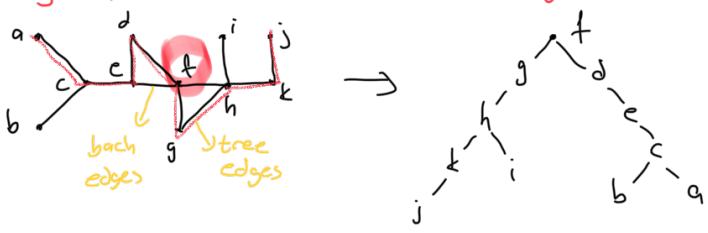
• inorder traversal is the original expression

spanning trees

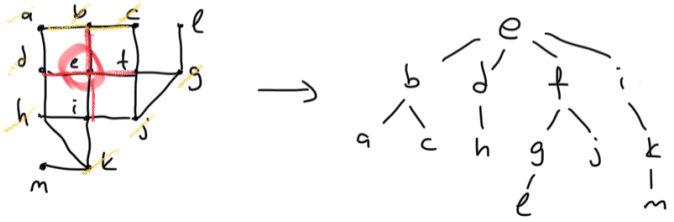
spanning trace of a graph = when all vertices covered with min possible number of edges without no cycles.  (ex)

spanning tree

using depth-first search to build spanning tree:



using breadth-first search to build spanning tree:



span = karizlamak, germek
mesafe.

* both depth/breadth first search can be done on directed graphs, but the result is not necessarily a spanning tree, but rather a spanning forest.