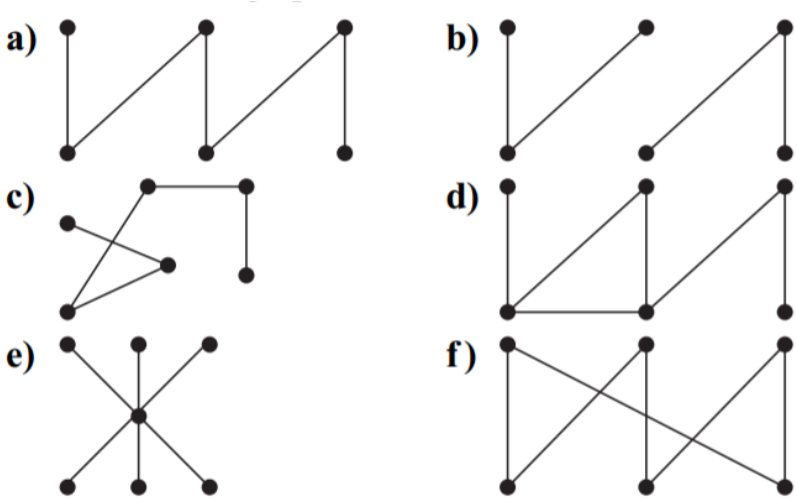
VE203 Discrete Math
Spring 2022 — Worksheet 8

April 16, 2022

Exercise 8.1 Tree Definition

Which of these graphs are trees?



Exercise 8.2 Tree Definition

Answer these questions about the rooted tree illustrated.

a) Which vertex is the root?

b) Which vertices are internal?

c) Which vertices are leaves?

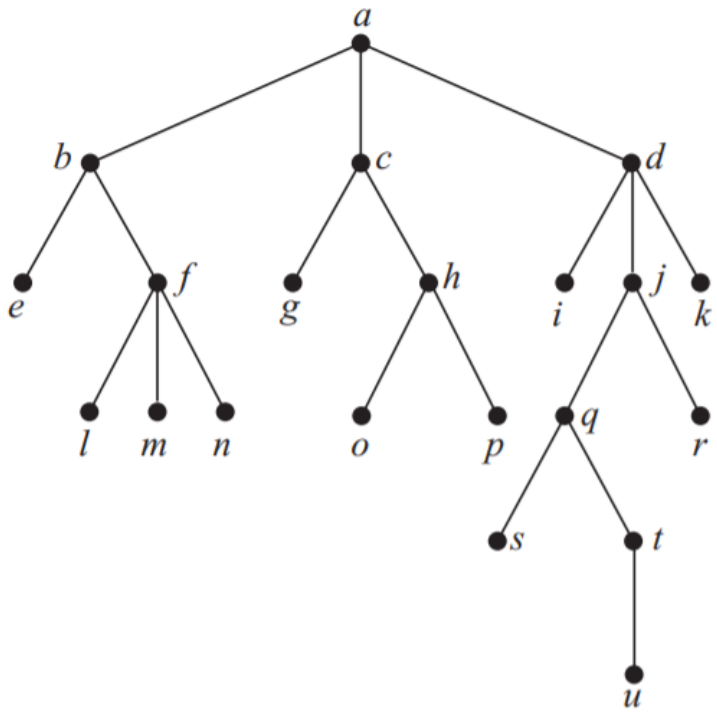
d) Which vertices are children of j ?

e) Which vertex is the parent of h ?

f) Which vertices are siblings of o ?

g) Which vertices are ancestors of m ?

h) Which vertices are descendants of b ?



Exercise 8.3 Spanning Tree

Find a spanning tree for each of these graphs.

a) K_5

b) $K_{4,4}$

c) $K_{1,6}$

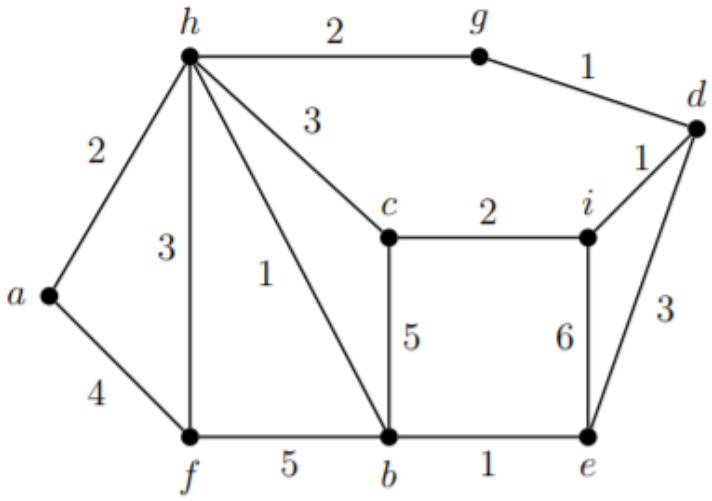
d) Q_3

e) C_5

f) W_5

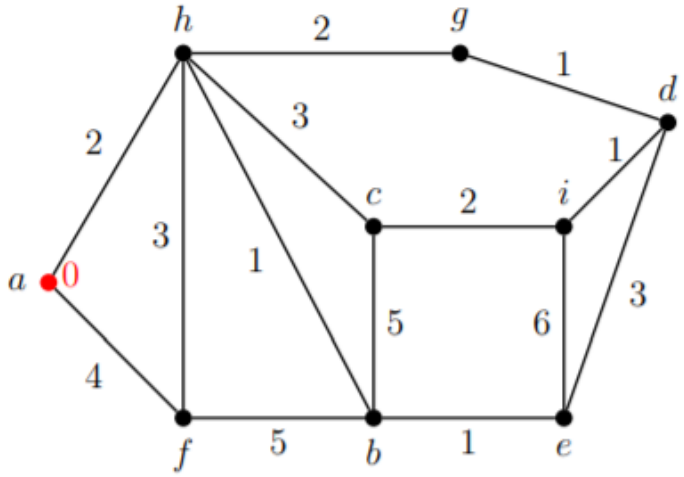
Exercise 8.4 Kruskal's algorithm

Find a minimum-weight spanning tree via Kruskal's algorithm. List the edges chosen in order and sketch the tree.



Exercise 8.5 Dijkstra's algorithm

Given the root vertex a, find a shortest-path spanning tree via Dijkstra's algorithm. List the edges chosen in order, list the shortest path distance (from root vertex) to each vertex. Sketch the tree.



Reference

1. Rosen, Kenneth H., and Kamala Krithivasan. Discrete mathematics and its applications: with combinatorics and graph theory. Tata McGraw-Hill Education, 2012.

2. Fraleigh, John B. A first course in abstract algebra. Pearson Education India, 2003.