

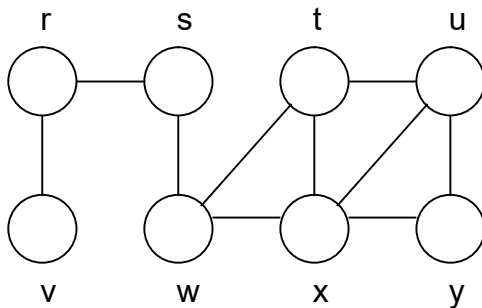
Algorithm Analysis

Handout 5

Deadline November 27

Exercise 5.1

Let be given the following undirected graph:



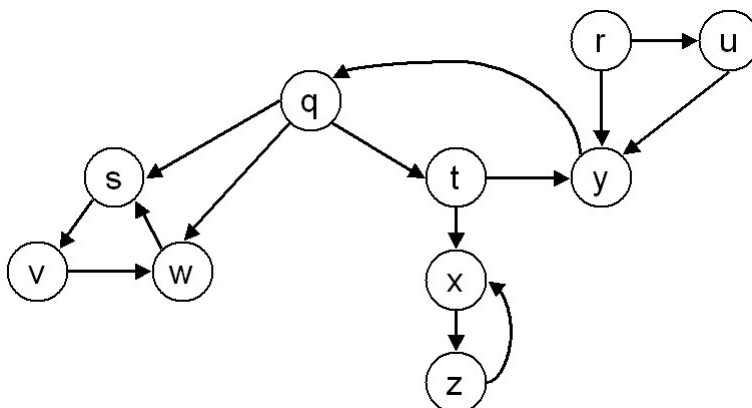
Show the d and π value that result from running breadth first search on the undirected graph above, using vertex u as source.

Exercise 5.2

Make a 3-by-3 chart with row and column labels WHITE, GRAY, and BLACK. In each cell (i, j) , indicate whether, at any point during a depth-first search of a **directed** graph, there can be an edge from a vertex of colour i to a vertex of colour j . For each possible edge, indicate what edge types (Tree edge, back edge, forward edge, cross edge) it can be. Make a second such chart for depth-first search of an **undirected** graph.

Exercise 5.3

Show how depth-first search works on the following graph:



Assume that the **for** loop of line 5-7 of the DFS procedure (textbook page 541) consider the vertices in alphabetical order, and assume that each adjacency list is ordered alphabetically. Show the discovery and finishing times for each vertex, and show the classification of each edge (tree edge, back edge, forward edge, cross edge).

Exercise 5.1

U : 0

T, X, Y: 1

W : 2

S : 3

R : 4

V : 5

Exercise 5.2

	White	Gray	Black
White	All	Cross, Back	Cross
Gray	Tree, Forward	Tree, Forward, Back	Tree, Forward, Cross
Black	X	Back	All

➔ Directed

	White	Gray	Black
White	X	Tree, Back	Tree, Back
Gray	Tree, Back	Tree, Back	Tree, Back
Black	Tree, Back	Tree, Back	All

➔ Undirected

Exercise 5.3

	D	F
Q	1	16
R	17	20
S	2	7
T	8	15
U	18	19
V	3	6
W	4	5
X	9	12
Y	13	14

z	10	11
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Tree : (q, s), (s, v), (v, w), (q, t), (t, x), (x, z), (t, y), (r, u)

Back : (w, s), (z, x), (y, q)

Forward: (q, w)

Cross: (r, y), (u, y)