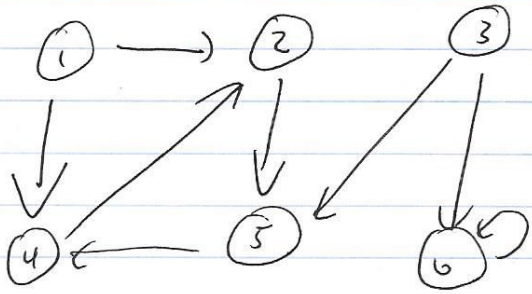
Ryan English HW #4

22.2-1 22.2-2 22.3-2 22.3-5

Due 04/07/21

22.2-1

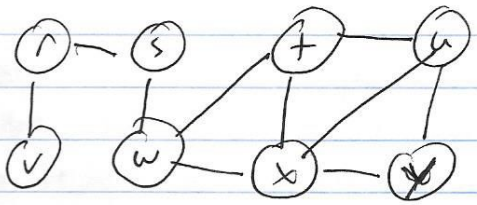
Show the $d$ and $\pi$ values that result from running BFS on Figure 22.2(a) using vertex 3 as the source




| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $d$ | $\infty$ | 3 | 0 | 2 | 1 | 1 |
| $\pi$ | NIL | 4 | NIL | 5 | 3 | 3 |

22.2-2

Same but Fig 22.3 vertex $u$ as source

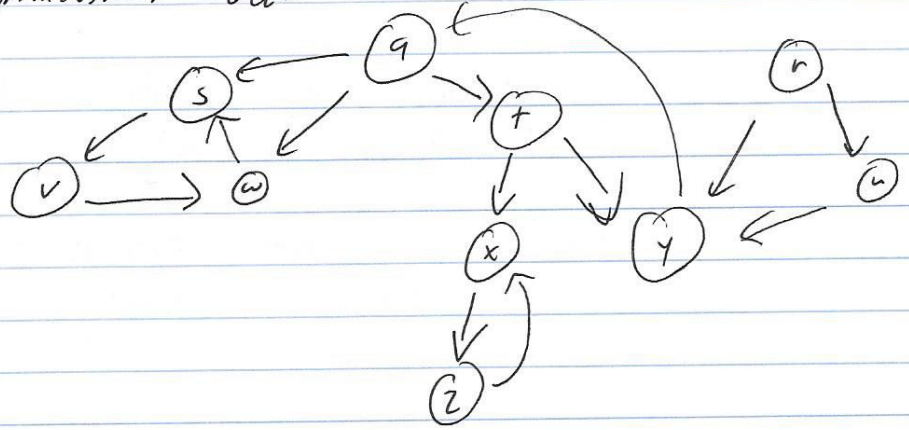



| | r | s | t | u | v | w | x | y |
|---|---|---|---|---|---|---|---|---|
| $d$ | 4 | 3 | 1 | 0 | 5 | 2 | 1 | 1 |
| $\pi$ | s | w | u | NIL | r | x | u | u |

22.3-2

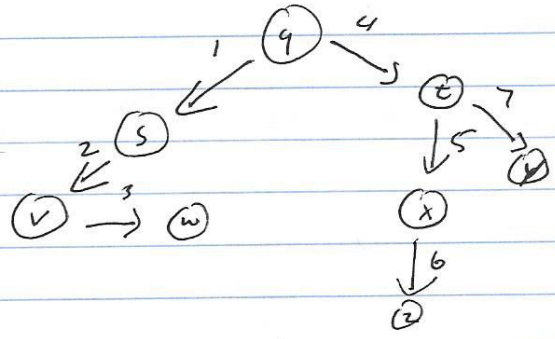
Show how BFS works on the graph 22.6

Assume for loop of lines 5-7 considers vertices in alphabetical order




Step 1

Start at q
Mark visited
Get neighbors s, w, t
Go to s




Step 2
Mark visited
Get neighbors v
Go to v

Step 3
Mark visited
Get neighbors w
Go to w

Step 4
~~Go back~~
Ignore s, w
Go to t

Step 5
mark visited
Get neighbors x, y
Go to x

Step 6
mark visited
Get neighs z
Go to z

Step 7
mark visited
ignore x
Go to y

| v | discover | fin |
|---|---|---|
| q | 1 | 7 |
| r | | |
| s | 2 | 4 |
| t | 4 | 7 |
| u | | |
| v | 2 | 3 |
| w | 1 | 3 |
| x | 5 | 6 |
| y | 7 | 7 |

22.3-5

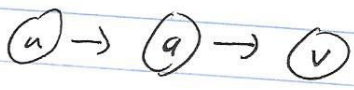
Show that edge $(u,v)$ is

a. a tree edge or forward edge if and only if $u.d < v.d < v.f < u.f$

b. a back edge if and only if $v.d \leq u.d < u.f \leq v.f$

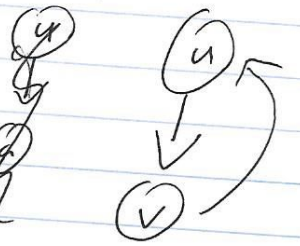
c. a cross edge if and only if $v.d < v.f < u.d < u.f$

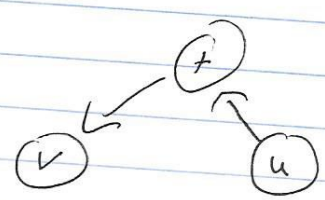
a. Tree edge = Edge $(u,v)$ if $v$ discovered by exploring edge $(u,v)$

So, $u$ is an ancestor of $v$ 


b. Back edge: connects back to an ancestor

So, $u$ is a descendant with a true back




c. Cross edge = all other 


So, $u$ was visited before $v$ at some point