a. Because u is the ancestor of v

b. u is the descendant of v. so It's a back edge in DFS.

c. It's shown that v is visited before u. Since Both v.d and v.f are smaller than attributes of u.

22-1

a. (1) If It's back edge, this indicates the two vertex connected with this edge one is the descendent of the other edge. But BFS doesn't contain the process of "moving up".
And for forward edges, It indicates the vertex of this edge connected has already Processed, this is impossible since all Processed vertexs must connect with the vertex without going through another two

(2) If only when ~~the~~ the edge goes to ~~be~~ the vertex that having been Processed yet can it be tree edge. So It's Path to root is at least the current vertex + 1

(3) ~~depth of vertex is cross edge wouldn't~~ Depth of vertex edge in Cross edge wouldn't variate more than 1

b. (1) ~~forward edges mean a Path from the root to the current~~
(1) BFS only consider shorter Path first, but in forward edge, we need to already Processed a vertex using more than one edge, that's not the short Path.

(2) Because it's tree edge that means ~~u~~ v is the direct descendant of u.

so $v.d = u.d+1$

(3) It's cross edge means that from the root to v, ~~u.d+1~~ $u.d+1$ serves as the upper bound for appending $v.d$ to $u.v$.

(4) (Inspired by CLRS) there's some path from v to u, there are all tree edges (since it's back edge). $v, v_1, v_2 \ldots v_k, u$ in this path. Let

$u.d = v_k.d+1 = v_{k-1}.d+2 = \ldots v.d+k+1$. so $u.d > v.d$

And $v.d > 0$.

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