

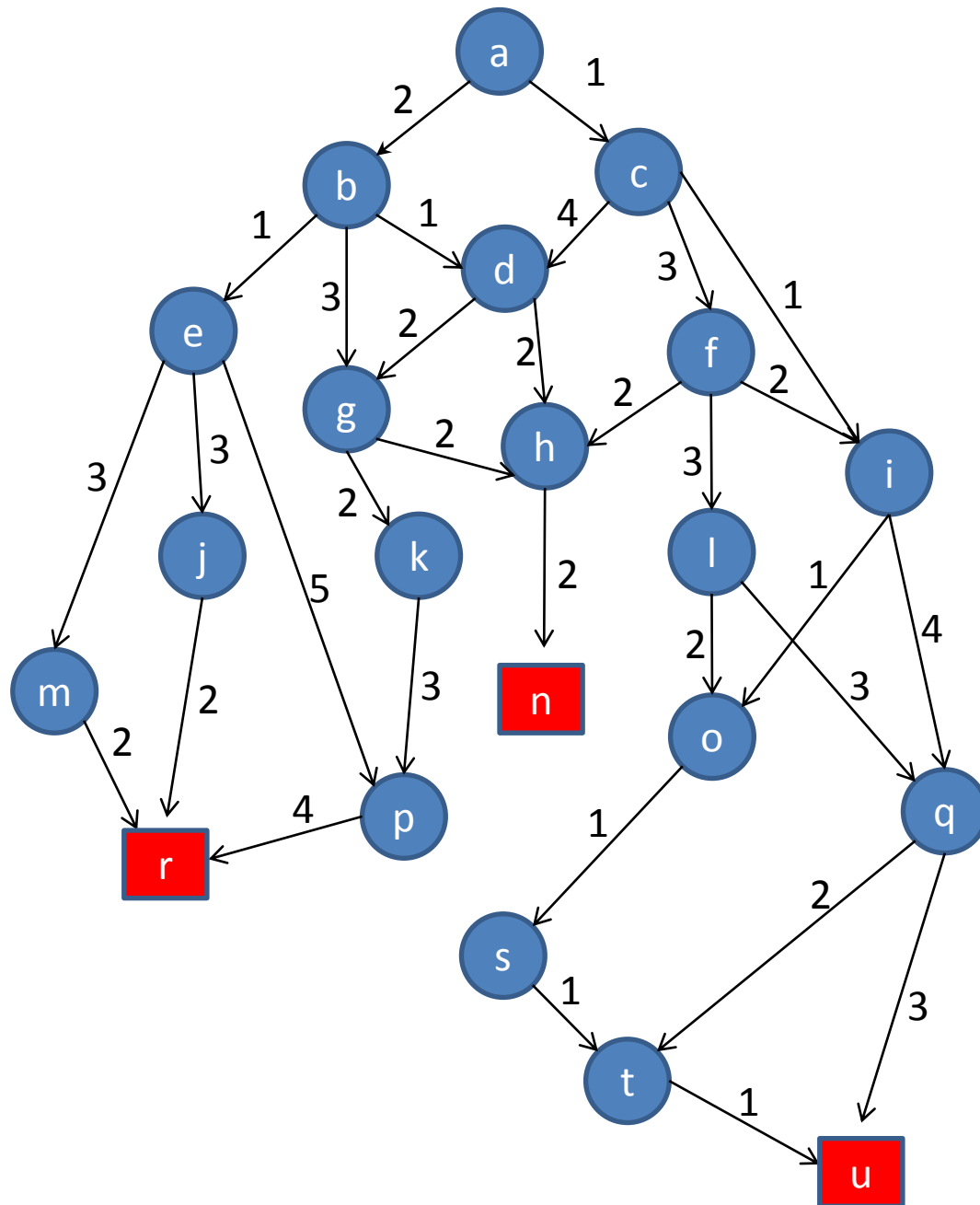
Q1 – In what order are the nodes in this search tree expanded by BFS?
(assume for a node's children nodes are expanded left-to-right)

Q2 – Which goal node is returned by BFS?

Q3 – In what order are nodes expanded by DFS?
(for nodes at the same level assume left-to-right order)

Q4 – Which goal node is returned by DFS

Goal nodes *are red squares*
Show the queue (BFS) or stack (DFS) of nodes to be expanded at each step

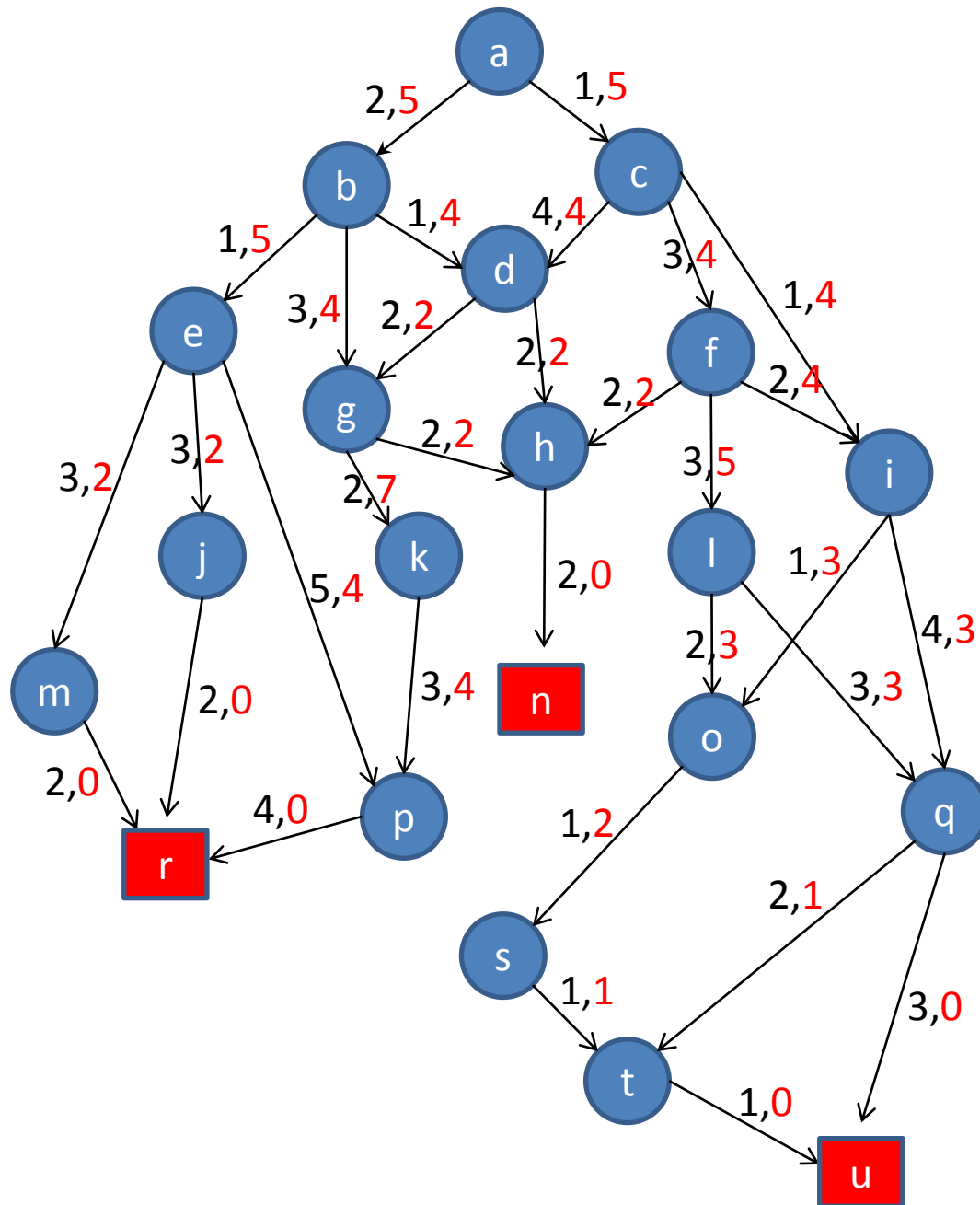


Q5 – In what order are the nodes in this search tree expanded by UCS?

Q6 – List the path from **a** to the optimal goal found by UCS.

Goal nodes are *red squares*

*Keep track of known shortest distances from **a** at each step, so you can show your TA how the expansion order was produced*



Q7 – In what order are the nodes in this search tree expanded by A*?

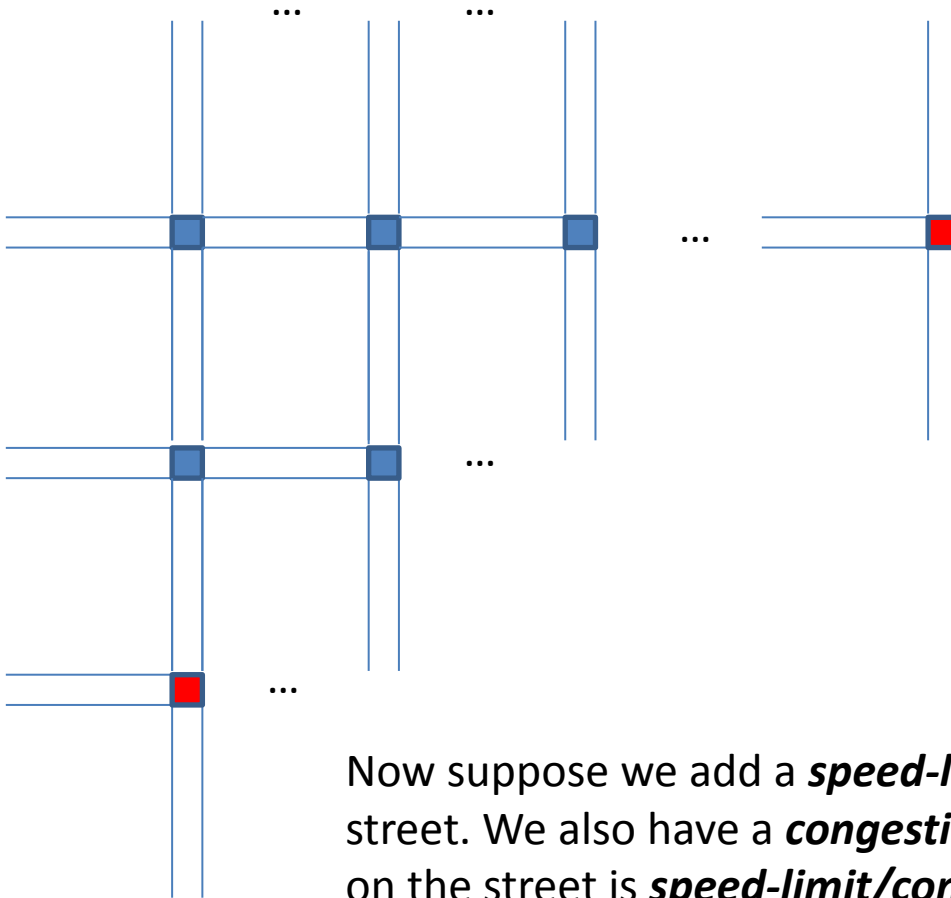
Q8 – List the path from **a** to the optimal goal found by A*

Q9 - Is this the optimal goal?

Q10 – Is the heuristic admissible?

Heuristic cost shown in **RED**

*Keep track of known cheapest move from **a** at each step, so you can show your TA how the expansion order was produced*



Consider the problem of planning an optimal (fastest) route between two addresses in a city.

Nodes are intersections, and for simplicity all streets have the same length so in terms of time, they all take ***the same amount of time to travel.***

Q11 – Are BFS and UCS equivalent here?

Q12 – Is there a unique optimal path?

Now suppose we add a ***speed-limit*** which is different for each street. We also have a ***congestion*** value such that the actual speed on the street is ***speed-limit/congestion***.

Q13 – Define an admissible heuristic to use with A* search so we can find the optimal path with less search than BFS.

The **1 minute paper**

One minute before the end of tutorial, your TA will ask you to bring out a clean sheet of paper to hand in. In this sheet you will write:

Name (last, first)

Student number

And **briefly** answer the following question:

Which of these topics: **Search trees, BFS, DFS, UCS, A*, heuristic functions** is not clear to you and what is your plan to master it fully.

Hand this sheet to your TA. We will use these 1-minute papers (there will be one after each tutorial) along with your TA's observations on your **preparedness, participation, and hard work** during tutorials to assess the 5% of your final mark corresponding to tutorial participation.