

Quiz 4

Started: Oct 31 at 3:49pm

Quiz Instructions

Question 1**2 pts**

Let G be a network. If increasing the capacity of edge e by 1 results in the increase of the value of the maximum flow by 1, then this edge e must be in every minimum cut of G .

- ☒ True
☐ False

Question 2**2 pts**

Let G be a network. Assume that all its edges have distinct capacity. If the minimum cut of G is unique, then the edge with smallest capacity must be in this minimum cut.

- ☐ True
☒ False

Question 3**2 pts**

Let $G = (V, E)$ be a network with s being the source vertex. Consider running the push-relabel algorithm on it. If when the algorithm terminates we have $h(v) \leq |V|$ for every vertex v in V , where h represents the labeling, then we must have that $(\{s\}, V - \{s\})$ is one minimum cut of G .

- ☒ True
☐ False

Question 4**4 pts**

Which one of the following statements is true about network X (shown on screen)?

- ☐ If the capacity of edge (a,b) is increased by 2, then the value of the maximum flow of the (updated) network will be increased by 2.
- ☒ It has a unique minimum cut.
- ☐ If the capacity of edge (b,t) is decreased by 2, then the value of the maximum flow of the (updated) network will be decreased by 2.
- ☐ The value of its maximum flow is 12.

Question 5**4 pts**

Consider running the push-relabel algorithm on network X (shown on screen). Let f be the preflow and let h be the labeling. Which one of the following statements is true?

- ☐ It is possible that, at some time point, the excess of b is 1.
- ☐ It is possible that, at some time point, $f(a,t) = 3$.
- ☐ It is possible that, at some time point, $h(b) = 4$.
- ☒ It is possible that, at some time point, $h(a) = h(b) + 2$.

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Network X:

