Worth: 2% **Due:** By 8:59pm on Tuesday 10 February

Remember to write your *full name* and *student number* prominently on your submission.

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*Please read and understand the policy on Collaboration given on the Course Information Sheet. Then, to protect yourself, list on the front of your submission **every** source of information you used to complete this homework (other than your own lecture and tutorial notes). For example, indicate clearly the **name** of every student with whom you had discussions, the **title and sections** of every textbook you consulted (including the course textbook), the **source** of every web document you used (including documents from the course webpage), etc.*

*For each question, please write up detailed answers carefully. Make sure that you use notation and terminology correctly, and that you explain and justify what you are doing. Marks **will** be deducted for incorrect or ambiguous use of notation and terminology, and for making incorrect, unjustified, ambiguous, or vague claims in your solutions.*

In lecture, we discussed a high-level algorithm to find a minimum cut (one with minimum capacity) in a network.

(a) Write a detailed implementation of this algorithm, in pseudocode. Include comments to explain what each part of your algorithm is doing.

In your algorithm, please do **not** paste algorithms from the lectures or textbook! Instead, simply *call* those algorithms as needed.

Analyse the worst-case running time of your algorithm. Again, please use results from the lectures or textbook as needed.

If you trace your algorithm on many inputs, you should notice that it has a particular property: when the network contains more than one possible minimum cut, your algorithm always returns a cut (S, T) where $|S|$ is minimum.

(b) Write a second algorithm that always returns a minimum cut (S, T) with $|T|$ as small as possible.

Explain clearly how your algorithm differs from the previous one, and why your algorithm has the desired property. (No formal proof required, just a clear and precise explanation. You may use, without proof, the fact that the first algorithm finds a cut with minimum $|S|$.)