

# FIT3155: Week 12 tutorial

## Covering concepts from Weeks 10-11

**Objectives:** The tutorials, in general, give practice in problem solving, in analysis of algorithms and data-structures, and in logic useful in the above.

**Instructions to the class:** Prepare your answers to the questions **before** the tutorial. It will probably not be possible to cover all questions unless the class has prepared them all in advance.

**Instructions to Tutors:**

- i. The purpose of the tutorials is not to solve the practical exercises.
- ii. The purpose is to check answers, and to discuss particular sticking points, not to simply make answers available.

1. Solve the following linear program using the tableau simplex method:

$$\max z = x + 2y$$

subject to the following constraints:

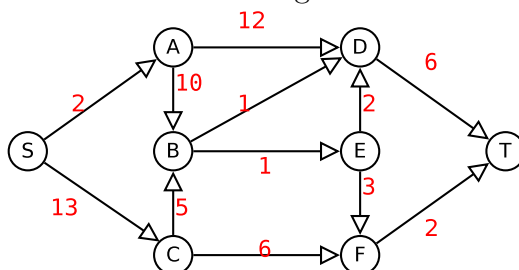
$$2x + 4y \leq 12$$

$$4x + 3y \leq 16$$

$$x \geq 0$$

$$y \geq 0$$

2. Consider the following network with the edge capacities marked in red:



Find the maximum flow in this network. Also show the minimum cut.

3. Revise the theorem that proves that Min-cut in a flow network is equal to its Max-flow.

4. The coordinator of Monash Faculty of IT's IBL program has a cohort of  $n$  students wanting to be placed with  $m < n$  companies. This year, each company  $1 \leq i \leq m$  has at most  $x_i$  places for Monash. Each student nominates exactly  $k$  companies (in no special order) that she/he wants to be placed with. After interviews, each company nominates  $y_i > x_i$  students (again in no special order) any of whom they would be happy hosting, but subject to their requirement constraint  $x_i$ .

Taking the respective student-company nominations into account, your IBL coordinator's goal is to assign the maximum number of students to mutually agreeable companies. Can you help your coordinator address this problem?

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