COMP108 Algorithmic Foundations Tutorial 11 w/c 5th May 2014

Name:

Hand this in to the demonstrator at the end of the tutorial even if you haven't finished it. You will get feedback next week. Tutorial participation contributes to 5% of overall marks.

1. Suppose there are two assembly lines each with 4 stations, $S_{i,j}$. The assembly time is given in the circle representing the station and the transfer time is given next to the arrow from one station to another.



(a) Using dynamic programming, fill in the table of the minimum time $f_i[j]$ needed to get through station $S_{i,j}$. You should also show **all** the intermediate steps in computing these values.

j	$f_1[j]$	$f_2[j]$
1		
2		
3		
4		

Intermediate steps:

- (b) What is the minimum time f^* needed to get through the assembly line?
- (c) Which stations should be chosen to achieve the minimum time?

2. Consider the following recurrence.

$$T(n) = \begin{cases} 1 & \text{if } n == 0 \text{ or } n == 1\\ 2 & \text{if } n == 2\\ T(n-1) + T(n-3) & \text{if } n > 2 \end{cases}$$

(a) Design and write a pseudo code for a recursive procedure to compute T(n).

(b) Draw the execution tree for T(7).

(c) Using the concept of dynamic programming, rewrite your recursive procedure into a non-recursive one.

3. **[Puzzle]** Forty-five Minutes: How do we measure forty-five minutes using two identical wires, each of which takes an hour to burn, but the wires burn **non-uniformly**. You can use as many matchsticks as you like.