

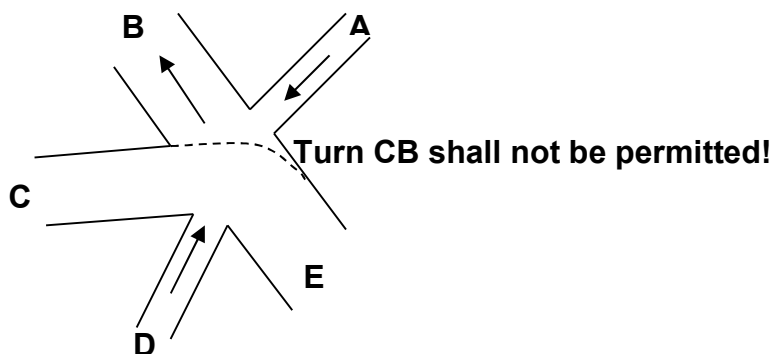
Handout 1

Deadline

October 4

Exercise 1.1

Design a traffic light for the following intersection according to the method presented in the first lecture. (Table of incompatible turns, graph showing incompatible turns, graph colouring) Describe the structure of the resulting traffic light system in few words.



Exercise 1.2

Illustrate the operation of merge sort and insertion sort on the array:

A = [3, 41, 52, 26, 38, 57, 9, 49]

Exercise 1.3

Give a description of the Insertion-Sort algorithm in Pseudocode, so that some given sequence of number is sorted in decreasing order instead of increasing order.

Exercise 1.4

Consider the following list of numbers. Your job is to erase as few of those numbers as possible such that the remaining numbers appear in increasing order. For example, erasing everything except the first two numbers leaves an increasing sequence; erasing everything except for first, third, sixth, and eighth numbers, does the same (but fewer numbers are erased).

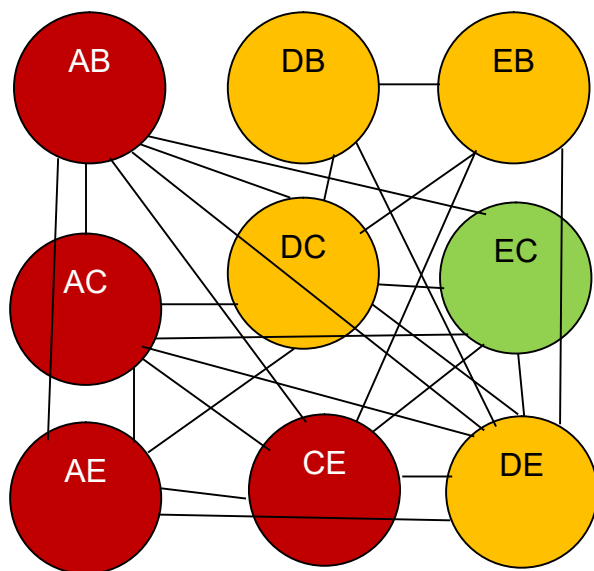
9 44 32 12 7 42 34 92 35 37 41 8 20 27 83 64 61 28 39 93 29 17 13 14 55

21 66 72 23 73 99 1 2 88 77 3 65 83 84 62 5 11 74 68 76 78 67 75 69 70 22

71 24 25 26

Exercise 1.1

	AB	DB	EB	AC	DC	EC	AE	CE	DE
AB		X	X	O	O	O	O	O	O
DB			O	X	O	X	X	X	O
EB				X	O	O	X	O	O
AC					O	O	O	O	O
DC						O	O	X	O
EC							X	O	O
AE								O	O
CE									O
DE									



There are many complex relations, for example, the relation of two is right, but their colors are different. And we have to cover one by one, I felt this method is not efficient, just complex.

Exercise 1.2

Merge sort

[3, 41, 52, 26] [38, 57, 9, 49]
[3, 41] [52, 26] [38, 57] [9, 49]
[3] [41] [52] [26] [38] [57] [9] [49]
[3, 41] [26, 52] [38, 57] [9, 49]
[3, 26, 41, 52] [9, 38, 49, 57]
[3, 9, 26, 38, 41, 49, 52, 57]

Insertion sort

[3, 41, 52, 26, 38, 57, 9, 49]
[3, 41, 26, 52, 38, 57, 9, 49]
[3, 26, 41, 52, 38, 57, 9, 49]
[3, 26, 41, 38, 52, 57, 9, 49]
[3, 26, 38, 41, 52, 57, 9, 49]
[3, 26, 38, 41, 52, 9, 57, 49]
[3, 26, 38, 41, 9, 52, 57, 49]
[3, 26, 38, 9, 41, 52, 57, 49]
[3, 26, 9, 38, 41, 52, 57, 49]
[3, 9, 26, 38, 41, 52, 57, 49]
[3, 9, 26, 38, 41, 52, 49, 57]
[3, 9, 26, 38, 41, 49, 52, 57]

Exercise 1.3

For $i(=0 \text{ to } \text{length}[A]-1)$

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While( $A[i] \geq A[i + 1]$  &  $i \geq 0$ )  
    Change  $A[i]$  &  $A[i + 1]$   
     $i = i - 1$ 
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Increasing order : the statement of while is i is bigger than $i + 1$

Decreasing order : the statement of while is $i + 1$ is bigger than i

Exercise 1.4

I got list [9 12 34 35 37 41 55 66 72 73 77 83 84]
[7 8 20 27 28 29 55 66 72 73 74 76 78], with 13 elements.