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CS555/455

Fall 2016

Programming Assignment 1
(Due on September 19, 2016 by 11:59pm)

I. Questions (20%):

(1) (as 2.11) (4%) Consider the two image subsets, S1 and S2, shown in the following figure. For V = {1}, determine whether these two subsets are (a) 4-adjacent, (b) 8-adjacent, or (c) m-adjacent.

```
        S1            S2
0 | 0  0  0  0 | 0  0  1  1 | 0
1 | 0  0  1  0 | 0  1  0  0 | 1
1 | 0  0  1  0 | 1  1  0  0 | 0
0 | 0  1  1  1 | 0  0  0  0 | 0
0   0  1  1  1  0  0  1  1  1
```

a) No

b) Yes

c) Yes

(2) (as 2.15) (4%) Consider the image segment shown

    (a) Let V= {0,1} and compute the lengths of the shortest 4-, 8-, and m-path between p and q. If a particular path does not exist between these two points, explain why.

```
3 1 2 1 q
2 2 0 2
1 2 1 1
p 1 0 1 2
```

4) DNE. No way to get to last 1.
8) 6
m) 6

    (b) Repeat for V = {1,2}.

```
    3  1  2  1 (q)
    2  2  0  2
    1  2  1  1
(p) 1  0  1  2
```

```
3 1 2 1 q
2 2 0 2
1 2 1 1
p 1 0 1 2
```

4) 7
8) 5
m) 5

(3) Based on the definition of EXTADD(f, g),

(a) (2%) Design a block diagram to realize the EXTADD(f, g) operation using ADD and EXTEND operations.
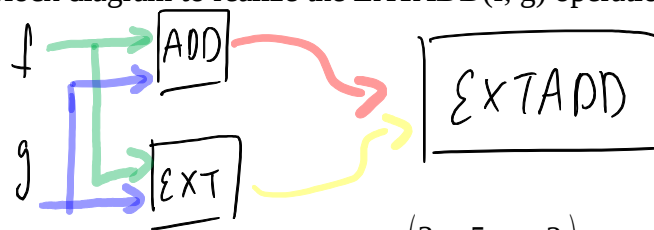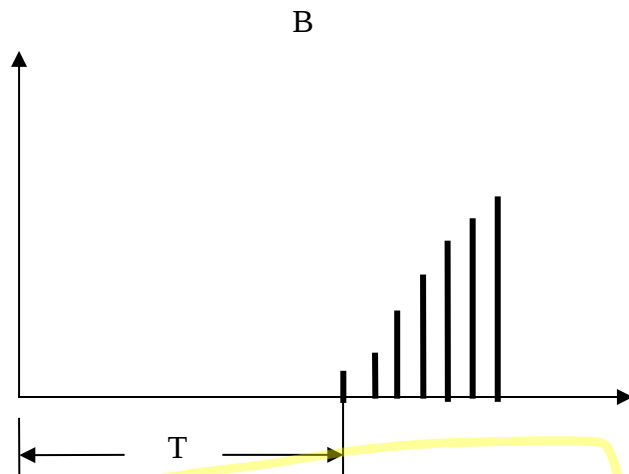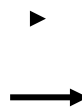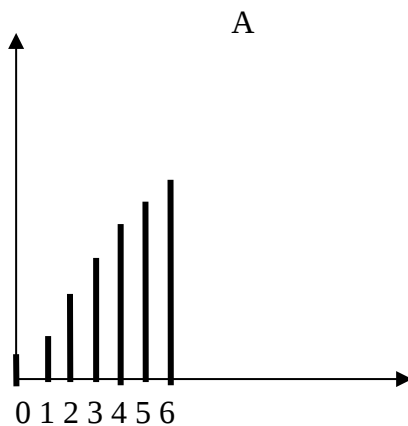

(b) (2%) Compute the EXTADD(f, g), where $f = \begin{pmatrix} 3 & 5 & -2 \\ ¿ & 0 & ¿ \end{pmatrix}_{1,2}$; $g = \begin{pmatrix} 2 & 4 \\ 3 & 9 \\ -2 & ¿ \end{pmatrix}_{2,2}$ –

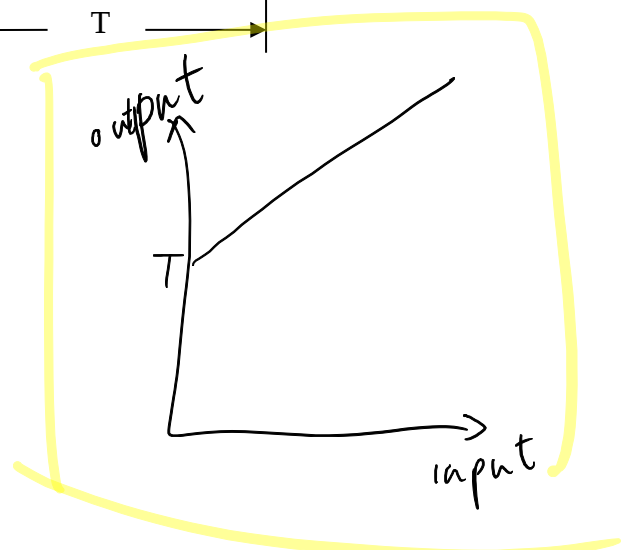$$EXTADD(f,g) = \begin{bmatrix} 5 & 9 & -2 \\ 3 & 9 & ¿ \\ -2 & ¿ & ¿ \end{bmatrix}$$

(4) 4%

Given the following histogram (A), after a shifting by T, the histogram becomes (B).
Write a transformation function and plot the transformation curve for such a shifting transformation.

$$B(x) = A(x - T)$$

(5) 4%

Give the histogram (A), after applying the transformation (C), plot the new histogram after the transformation.

A

C

output

255

0

0 1 2 3 4 5 6   255

255   input

▶