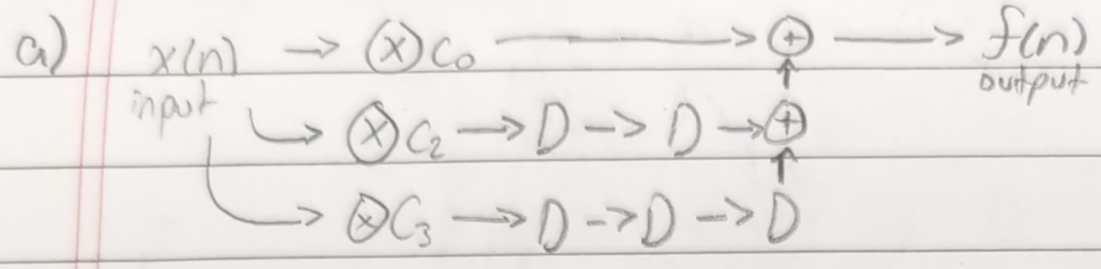
ECE 5560 Midterm 1

Gage Farmer

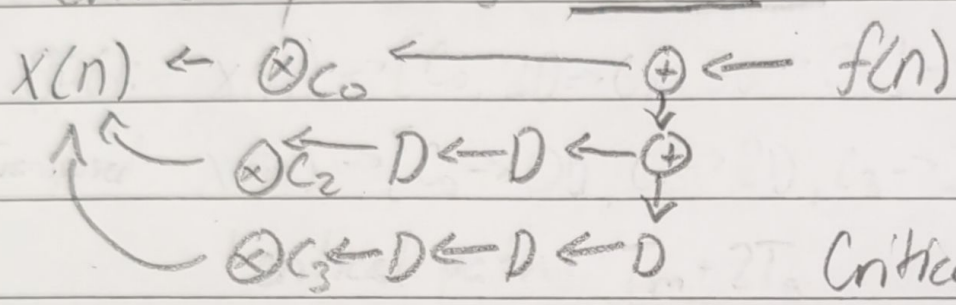
1) $f(n) = C_0x(n) + C_2x(n-2) + C_3x(n-3)$

a)



Critical path is $T_m + 2T_a$

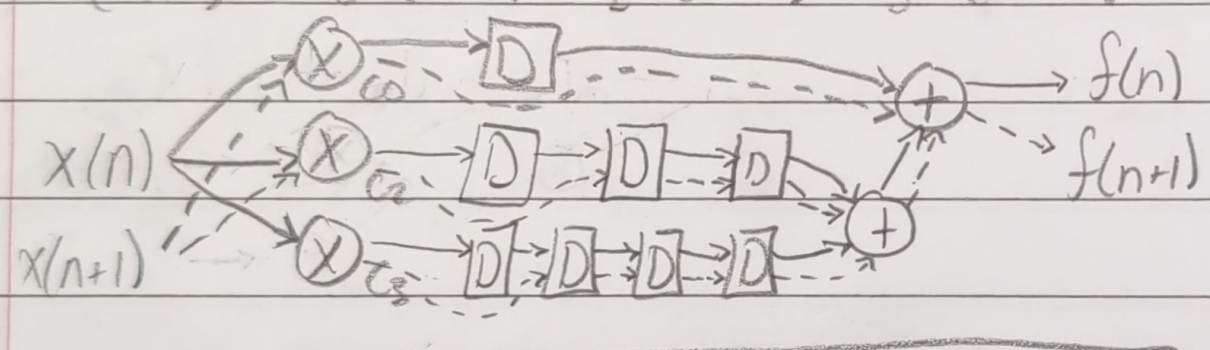
b)



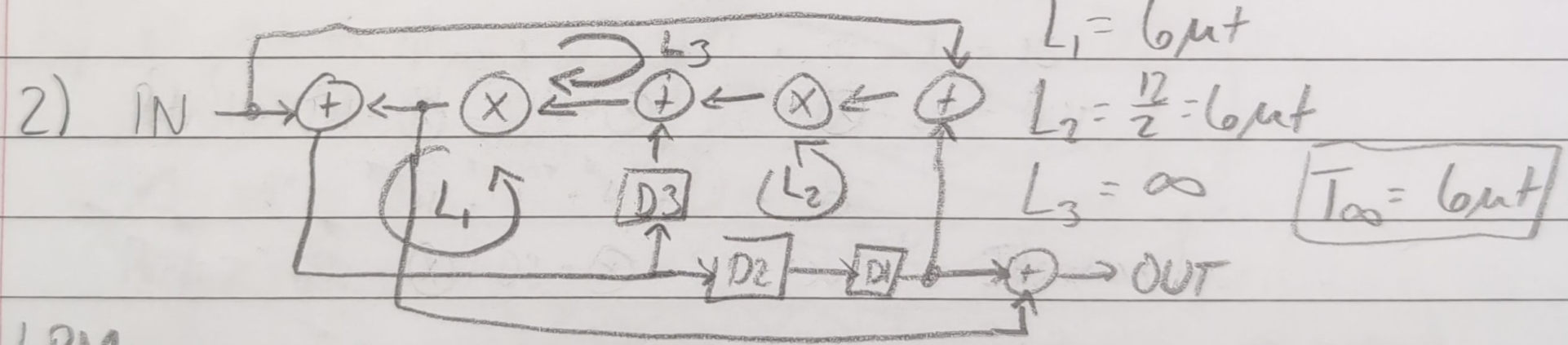
Critical path still $T_m + 2T_a$

c) $f(n) = C_0x(n) + C_2x(n-2) + C_3x(n-3)$

$f(n+1) = C_0x(n+1) + C_2x(n-1) + C_3x(n-2)$



2)



$L_1 = 6\mu t$

$L_2 = \frac{12}{2} = 6\mu t$

$L_3 = \infty$

$T_\infty = 6\mu t$

LPM:

$$L^1 = \begin{bmatrix} -1 & 14 & 14 \\ 0 & -1 & 1 \\ -1 & 8 & 8 \end{bmatrix}$$

$L^2_{ij} = Max\{-1, L^1_{ik} + L^1_{k,j}\}$

$[-1 \;\; \underline{14} \;\; 14] \begin{bmatrix} -1 \\ \underline{0} \\ -1 \end{bmatrix} = 14$

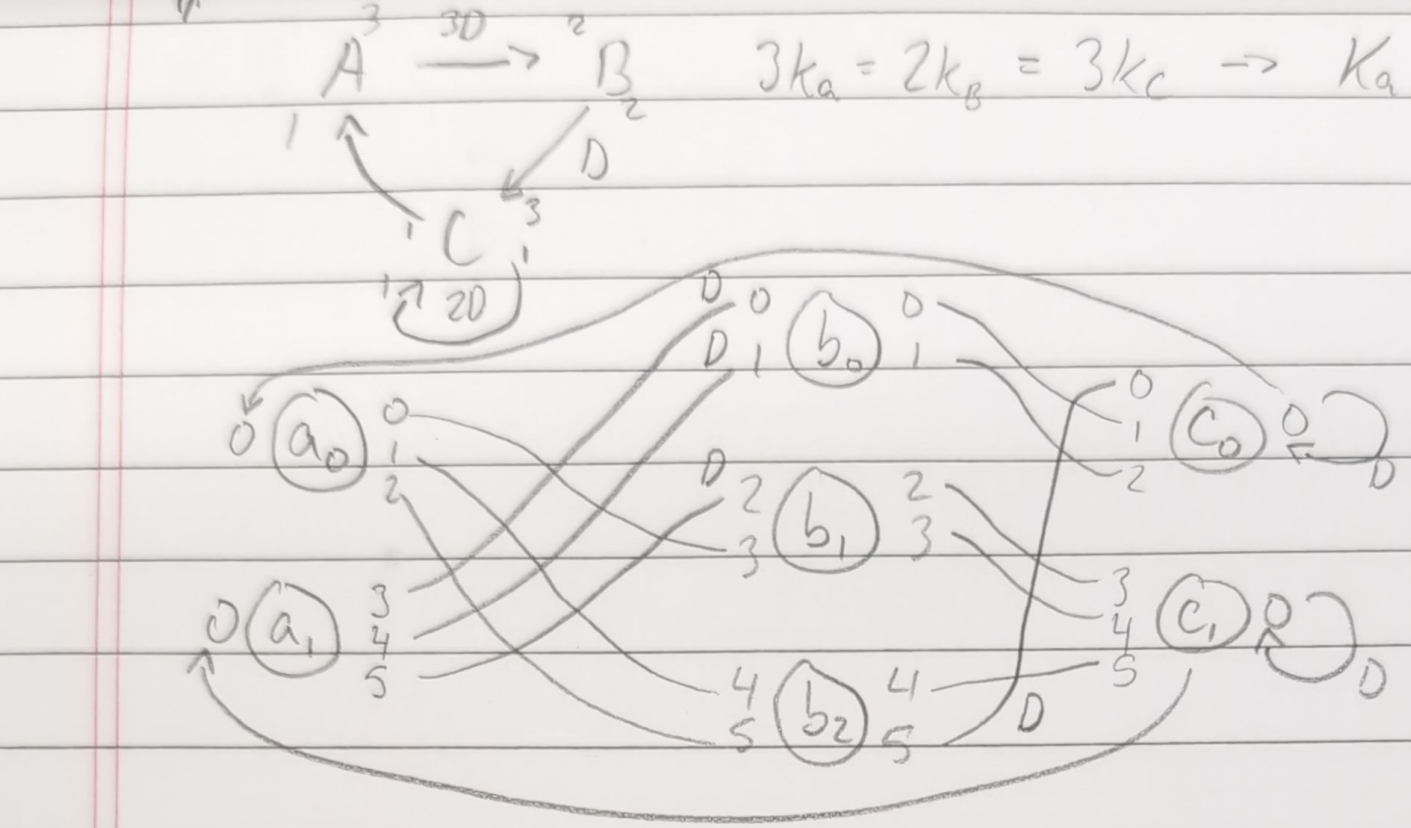
$$L^2 = \begin{bmatrix} 14 & 22 & 22 \\ -1 & 14 & 14 \\ 8 & 16 & 16 \end{bmatrix}$$

$L^3_{ij} = [-1 \;\; 14 \;\; \underline{14}] \begin{bmatrix} 14 \\ -1 \\ \underline{8} \end{bmatrix} = 22$

$$L^3 = \begin{bmatrix} 22 & 30 & 30 \\ 14 & 22 & 22 \\ 16 & 24 & 24 \end{bmatrix}$$

$T_\infty = 8\mu t$

4)



$3k_a = 2k_B = 3k_C \rightarrow K_a = K_c$

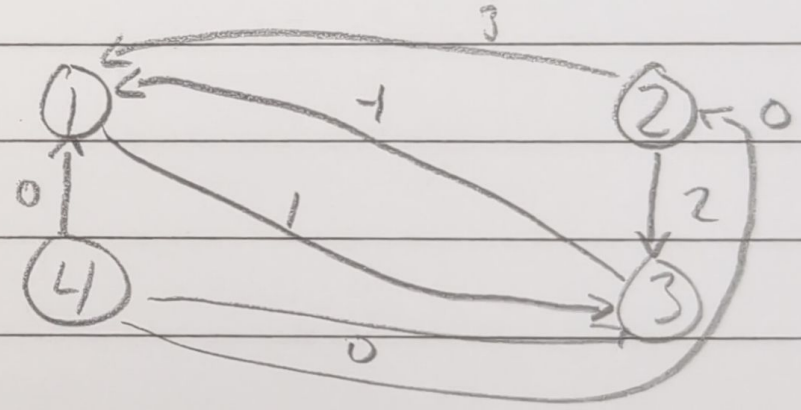
$A \rightarrow B$ [$3+3=6 = 1\times6+0$ $\quad 5+3=8=1\times6+2$; $4+3=7=1\times6+1$] Data goes to 0, 1, and 2

5) $x1 - x3 \leq -1$

$x1 - x2 \leq 3$

$x3 - x1 \leq 1$

$x3 - x2 \leq 2$



$$R^1 = \begin{bmatrix} 0 & \infty & 1 & \infty \\ 3 & \infty & 2 & \infty \\ -1 & \infty & \infty & \infty \\ 0 & 0 & 0 & \infty \end{bmatrix}$$

$R^2_{2,3} = \text{Max}\{R^2_{2,3}, (R^1_{2,1} + R^1_{2,3})\}$

$R^2_{uv} = \text{Min}\{R^1_{uv}, (R^1_{u1} + R^1_{1v})\}$

$$R^2 = \begin{bmatrix} \infty & \infty & 1 & \infty \\ 3 & \infty & 2 & \infty \\ -1 & \infty & 0 & \infty \\ 0 & 0 & 0 & \infty \end{bmatrix}$$

$$R^3 = \begin{bmatrix} \infty & \infty & 1 & \infty \\ 3 & \infty & 2 & \infty \\ -1 & \infty & 0 & \infty \\ 0 & 0 & 0 & \infty \end{bmatrix}$$

$$R^4 = \begin{bmatrix} 0 & \infty & 1 & \infty \\ 1 & \infty & 2 & \infty \\ -1 & \infty & 0 & \infty \\ -1 & 0 & 0 & \infty \end{bmatrix}$$

$$R^5 = \begin{bmatrix} 0 & \infty & 1 & \infty \\ 1 & \infty & 2 & \infty \\ -1 & \infty & 0 & \infty \\ -1 & 0 & 0 & \infty \end{bmatrix}$$

Solutions $r_1 = -1, r_2 = 0, r_3 = 0$