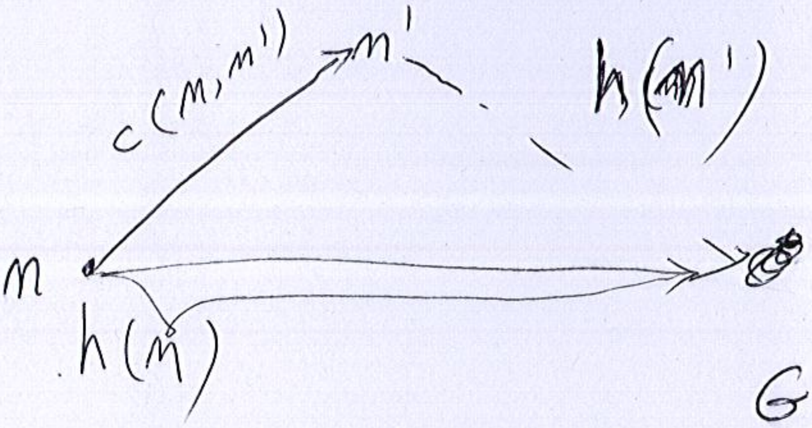
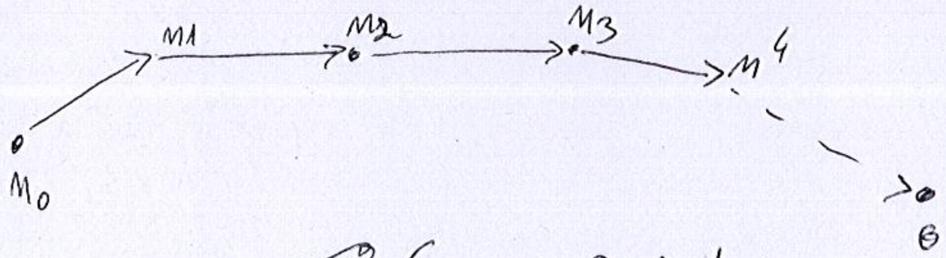


$$(1) \quad \forall n, \forall \mathrm{dex}\, n' \;\; h(n) \leq c(n, n') + h(n')$$



$$h(n_0) \leq \cancel{h(n_1}(n_0 n_1) + h(n_1)$$

$$h(n_1) \leq c(n_1, n_2) + h(n_2)$$

— — —

$$h(n_k) \leq c(n_k, G) + \underbrace{h(G)}_{=0}$$

$$h(n_0) \leq c(n_0, n_1) + c(n_1, n_2) + h(n_2)$$

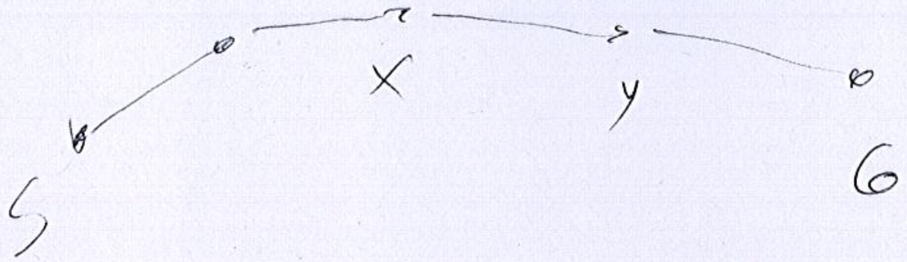
$$h(n_0) \leq \Sigma(c(n_{i+1}, n_i)$$

$$h(n_0) \leq C^*$$

$$f(n_0) \leq C^{\circ}$$

$\forall n, n' \quad h(n) - h(n') \le c(n, n')$

$\Sigma \qquad \Sigma$



$h(n) \le c(n\, n') + h(n')$

1) $f(n') \ge f(n)$

$f(n') = g(n') + h(n') =$

$= c(n\, n') + g(n) + h(n') \ge g(n) + h(n)$

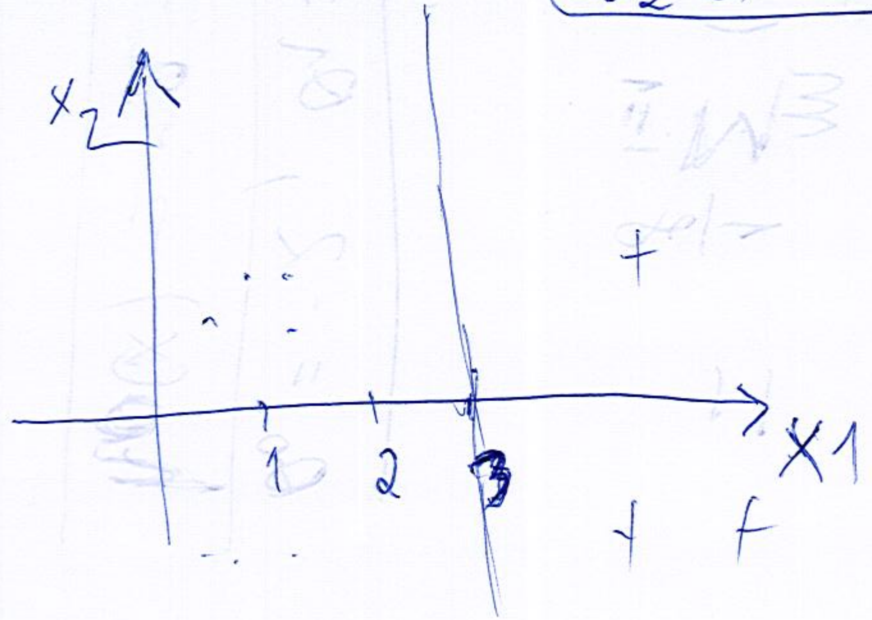
$= f(n)$

$\underline{f \nearrow} \quad \wedge\, f \le C^*$

$$\begin{cases} \theta_0 + \theta_1 x_1 + \theta_2 x_2 \geqslant 0 \\ x_1 \geqslant 3 \end{cases} \Rightarrow \begin{cases} \theta_2 = 0 \\ \left.\begin{array}{l} \theta_0 + \theta_1 x_1 \geqslant 0 \\ x_1 \geqslant 3 \end{array}\right\} \Rightarrow \end{cases}$$

$$\left.\theta_1 x_1 \geqslant -\theta_0 \iff x_1 \geqslant -\frac{\theta_0}{\theta_1}\right\} \quad \left.\begin{array}{l} x_1 \geqslant 3 \\ x_1 \geqslant -\frac{\theta_0}{\theta_1} \end{array}\right\} \Rightarrow -\frac{\theta_0}{\theta_1} = 3$$

$$\Rightarrow \begin{cases} \theta_0 = -3\theta_1 \iff \boxed{\begin{array}{l} \theta_1 = -\frac{\theta_0}{3} \\ \theta_2 = 0 \end{array}} \end{cases}$$



$h_\theta(x) = \theta_0 + \theta_1 x$

$J(0,1)$

$h_{(0,1)}(x) = x$

$$J(0,1) = \frac{1}{8}\sum \left(h_{(0,1)}(x) - y\right)^2 =$$

$$= \frac{1}{8}\sum_{i=1}^{m} (x-y)^2 = \frac{1}{8}(1+1+1+1)$$

$$= \frac{1}{2}$$

$\theta_0 = -2, \ \theta_1 = 0{,}5$

$h_\theta(x) = -2 + 0.5x$

$h_\theta(6) = -2 + 0{,}5 \cdot 6 = 1$

$h_\theta(x) = y$

$\boxed{\theta_0 + \theta_1 x = y}$

$h_\theta(x) = \theta_0 + \theta_1 x$) y 3

$$\left.\begin{array}{l}\theta_0 + \theta_1 1 = -890 \\ \theta_0 + \theta_1 \cdot 2 = -1411\end{array}\right\} = \left\{\begin{array}{l}\theta_0 = -\theta_1 - 890 \\ -\theta_1 - 890 + 2\cdot\theta_1 = -1411\end{array}\right.$$

$\theta_1 = 890 - 1411 = \underline{-521}$

$\theta_0 = 521 - 890 = -369$

Tes

$$\left\{\begin{array}{l}\theta_0 + 8\theta_1 = -5471 \\ \theta_0 + 10\theta_1 = -5157\end{array}\right\} = \left\{\begin{array}{l}\theta_0 = -5471 - 8\theta_1 \\ -5471 - 8\theta_1 + 10\theta_1 = -5157\end{array}\right.$$

~~$\theta_1 (10 - 8 \cdot 5471) = -5157$~~

$2\theta_1 = -5157 + 5471$

a) $-1780 + 530 = -1250$

$-1780 + 2.530$

b)

1) $dW^{[l]} = \frac{1}{m} dZ^{[l]} \cdot A^{[l-1]T}$

2) $db^{[l]} = \frac{1}{m} \sum_{i=1}^{m} dZ^{[l](i)}$

3) $dA^{[l-1]} = W^{[l]T} \cdot dZ^{[l]}$

4) $dZ^{[l]} = dA^{[l]} * g'(Z^{[l]})$

$dZ^{[l-1]} = dA^{[l-1]} * g'(Z^{[l-1]})$ $\cancel{= W^{[l]T} \cdot dZ^{[l]} \cdot g'(Z^{[l-1]})}$

As we have $dZ^{[l-1]} \Rightarrow dA^{[l-2]} = W^{[l-1]T} \cdot dZ^{[l-1]}$

then $dZ^{[l-2]} = dA^{[l-2]} \cdot g'(Z^{[l-2]})$

then $dA^{[l-3]} = W^{[l-2]T} \cdot dZ^{[l-2]}$

the $dZ^{[l-3]} = dA^{[l-3]} \cdot g'(Z^{[l-3]})$

l

$$a = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \qquad \begin{bmatrix} 4 & 1 \\ 2 & 2 \end{bmatrix} \qquad \begin{bmatrix} 4 & 1 \\ 2 & 2 \end{bmatrix}$$

$$x \to \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 \\ 11 \end{bmatrix}$$

9 10
5 6
11 12
7 8

0 2 1

(9, 1, 2)

1 2 23 17
3 4 39 53

7 + 16

24
11

5 6 □ □
7 8 □ □

1 2
3 4

21
32

~~21 35~~

23 29

21 35

21
32

$$\begin{array}{cc|cc} & & 5 & 7 \\ & & 6 & 8 \\ \hline 1 & 2 & 19 & 22 \\ 3 & 4 & 39 & 53 \end{array}$$

24
15

21
32
53

5

9 10
11 12
7 8

1 2
3 4

19 22
31 34

31 34

16
6
22

24
11
35

32
18
50

28
15
43