EE660 Oct 24

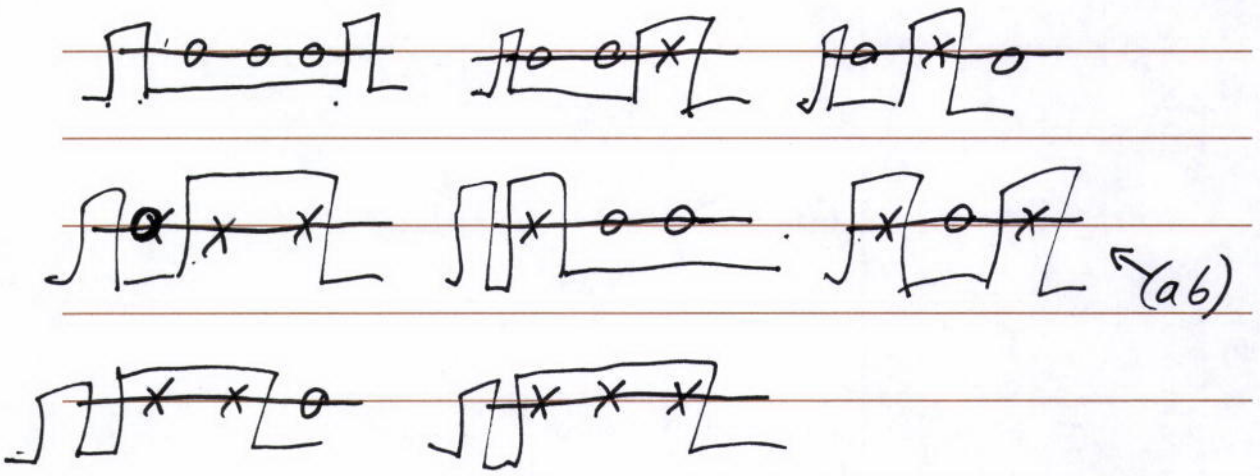
Discussion 10

Today:
Midterm solutions

—x—

Problem 2

a) 3 points $\overset{?}{\Rightarrow}$ 8 dichotomies
Let x = +1, o = -1



Yes

b) $m_H(3) = 2^3 = 8$

$m_H(2) < 2^2 = 4$

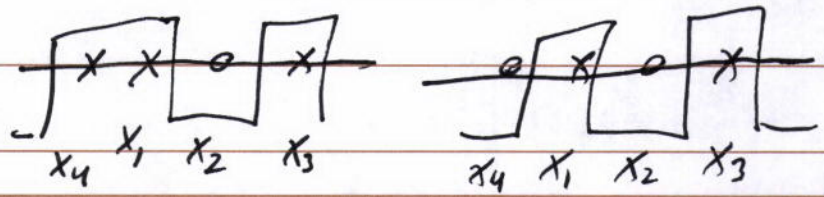
$m_H(1) = 2$

$N = 4$

For all $a_1 \dots a_8$ except a_6 we can add x_4 before the existing ones and classify it as + or − using the "extra" interval to the left.

This gives us $2 \times 7 = 14$ dichotomies

Check a_6



$m_H(4) = \underline{16}$

$N = 5$

We cannot get 

$m_H(5) = 2^5 - 1 = 31$

c) $m_H(4) = 2^4$

$m_H(5) < 2^5$

$d_{VC} = 4$

$K = 5$

Problem 3

(a) i.) $E_{out}(h_g^{(LP)}) \le E_v(h_g^{(LP)}) + \sqrt{\frac{1}{2N_v} \ln \frac{2M}{\delta}}$, $M = 1$

ii.) $E_{out}(h_g^{(LP)}) \le E_{Tr}(h_g^{(LP)}) + \sqrt{\frac{8}{N_{Tr}} \ln \frac{4[(2N_{Tr})^{d_{vc}^{(LP)}} + 1]}{\delta}}$

(i) has lower E.

b) $E_{out}(h_g^{(2P)}) \le E_v(h_g^{(2P)}) + \sqrt{\frac{1}{2N_v} \ln \frac{2M}{\delta}}$, $M = 1000$ (i)

$E_{out}(h_g^{(2P)}) \le E_{Tr}(h_g^{(2P)}) + \sqrt{\frac{8}{N_{Tr}} \ln \frac{4[(2N_{Tr})^{d_{vc}^{2P}} + 1]}{\delta}}$ (ii)

(i) has lower E

c) Similar to (a) and (b) $M = 1000$

d) $E_{out}(h_g^{(P^*)}) \le E_v(h_g^{(P^*)}) + \sqrt{\frac{1}{2N_v} \ln \frac{2M}{\delta}}$ $M = 2001$

1 hyp. from LP

1000 hyp. from 2P

1000 " " 3P

e) $E_{OUT}(h_g^{(\rho\#)}) \leq E_{Test}(h_g^{(\rho\#)}) + \sqrt{\frac{1}{2N_{Test}} \ln \frac{2M}{\delta}}$, $M=1$

f) The bound in (e) (using E_{Test})