

Subject: Clarification on Midterm Problem 7.c

Dear Professor,

I am writing this email to discuss something about the midterm problem 7.c.

I am not very fond of writing these emails discussing test points, but this one is particularly important for me.

Quick clarification: I knew the dimensions of both G and H and also the dimensions of the Identity matrices in both them including the B and B transpose parts, but I really wanted to make sure I don't make a mistake here (because it was worth 20 points), therefore I also thought to check it with a real example, maybe it is more tricky statement.

The way I thought about the problem is that I took the example in the first exercise, and I created the generator and the parity check matrix:

$$c_0 = (000000) \quad c_1 = (011111) \quad c_2 = (101100) \quad c_3 = (110011)$$

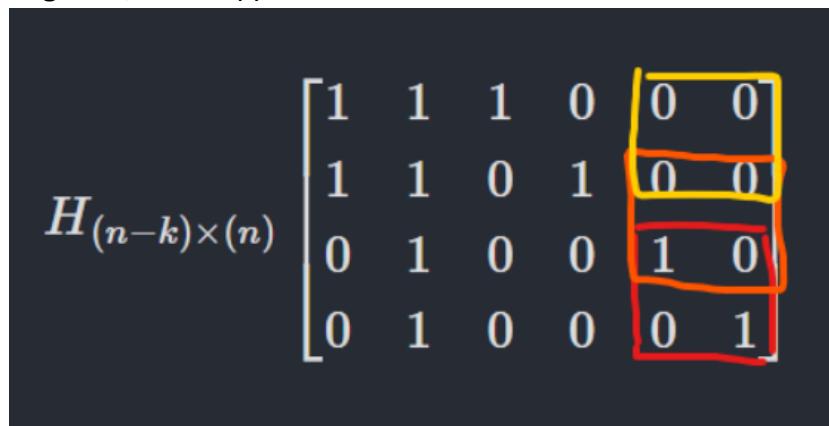
$$G_{n \times k} = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$

$$H_{(n-k) \times (n)} = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Now, the exact statement in the exercise is this:

✓ c. The last $k \times k$ segment of the parity check matrix of a systematic linear binary code is the identity matrix.

Now, when you read the 'The last $k \times k$ segment,' you clearly come to the question, which segment, the upper submatrix or the bottom submatrix:


$$H_{(n-k) \times (n)} = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

What exactly is the meaning of **last** here? From here we get the **first argument** that the question lacks explicitly which should not be allowed on exact tests.

Now, after careful consideration, I see that this picture works for when $n-k \geq k$. But sincerely, in nearly every exercise we have done, $n-k$ was greater than k because we needed the *d_{min}* to be at least 3 so we could correct 1 error (like Hamming codes). It is true you can find SLBC codes like $C(3,2)$ where the $n-k < k$, but I don't think the exercise wanted us

to go into this rabbit hole. From here we get the ****_second argument**** that from the previous exercise and from the first argument (the lack of explicitly) the student can easily misinterpret the statement into a harder one.

In the lights of the reasons mentioned. I sincerely think that getting 80 points on the test in which I only made one small mistake because of an ambiguous statement, is inhumane and not morally right.

To top it off, they didn't allow us to use our own computers, and the computers we had caused me a lot of trouble. I had to change them 3 times during the test, which lost me a great amount of time. One shut down (the instructor wasn't able to fix it for a great amount of time therefore I had to change computer and do the log in steps *again*), and the others just showed the security connection problem.

I understand that you may have a lot of students to manage, and caring for one is not a big deal, but I really hope you take this into consideration, not only for me but also for the other generations to come.

Best Regards,
Klevis Imeri
T4XGK0

Note:

I also have the +1 grade I was awarded during the lecture, maybe I can use that to fix this one apparently "incorrect" click.