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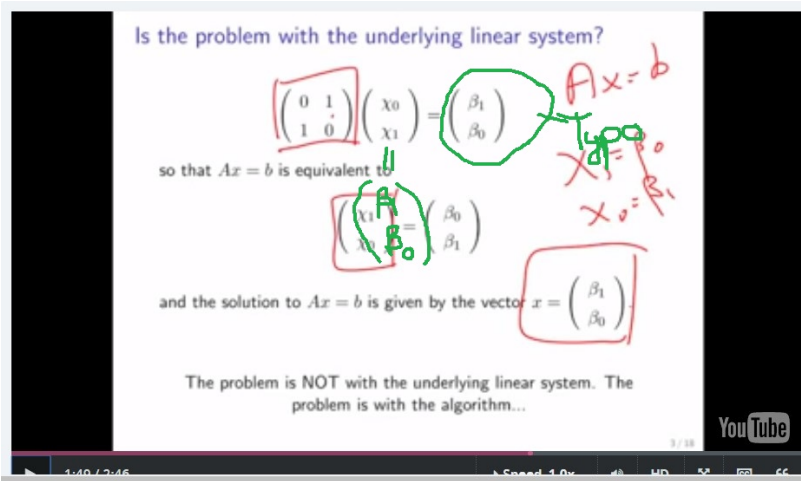
7.2.2 The Problem

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Week 7 due Nov 20, 2023 01:42 IST Completed

7.2.2 The Problem

There is a typo in the following video. In particular, in the slide



The error is circled in green in the above. The elements beta_0 and beta_1 of vector b should be reversed.

Thank you to Neon-007 for reporting.

[Start of transcript. Skip to the end.](#)



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Reading Assignment

0 points possible (ungraded)
Read Unit 7.2.2 of the notes. [\[LINK\]](#)

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Homework 7.2.2.1

1/1 point (graded)

Solve the following linear system, via the steps in Gaussian elimination that you have learned so far.

$$\begin{aligned} 2x_0 + 4x_1 + (-2)x_2 &= -10 \\ 4x_0 + 8x_1 + 6x_2 &= 20 \\ 6x_0 + (-4)x_1 + 2x_2 &= 18 \end{aligned}$$

Mark all that are correct:

☒ The process breaks down.

☐ There is no solution

☒
$$\begin{pmatrix} x_0 \\ x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 4 \end{pmatrix}$$

✓

Explanation

Answer: (a) and (c)

Solving this linear system via Gaussian elimination relies on the fact that its solution does not change if equations are reordered.

Now,

- By subtracting $(4/2) = 2$ times the first row from the second row and $(6/2) = 3$ times the first row from the third row, we get

$$\begin{aligned} 2x_0 + 4x_1 + (-2)x_2 &= -10 \\ 0x_0 + 0x_1 + 10x_2 &= 40 \\ 0x_0 + (-16)x_1 + 8x_2 &= 48 \end{aligned}$$

- Now we've got a problem. The algorithm we discussed so far would want to subtract $((-16)/0)$ times the second row from the third row, which causes a divide-by-zero error. Instead, we have to use the fact that reordering the equations does not change the answer, swapping the second row with the third:

$$\begin{aligned} 2x_0 + 4x_1 + (-2)x_2 &= -10 \\ 0x_0 + (-16)x_1 + 8x_2 &= 48 \end{aligned}$$

Calculator

$$0x_0 + (-10)x_1 + 0x_2 = 40$$
$$0x_0 + 0x_1 + 10x_2 = 40$$

at which point we are done transforming our system into an upper triangular system, and the backward substitution can commence to solve the problem.

Submit

i Answers are displayed within the problem

Video

[Start of transcript. Skip to the end.](#)



Dr. Robert van de Geijn: So hopefully you did the homework.

And what you noticed is that performing the first step of Gaussian eliminations with these equations was not a problem.

But then, when you tried to perform the next step, you did run into a problem.

▶

0:00 / 0:00

▶ 2.0x

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