Instructions:

- Solve the following questions on a sheet of paper (do not need to type).
- Write your Last name, First name, and Student ID on the top of the first page.
- Take photos or scan each page by a phone or scanner.
- Turn your photos into a single PDF file using free softwares for merging PDF files such as: `https://pdfresizer.com/`
- Upload your answers in a single PDF file in the Assignment section of the course website. Make sure your file is in PDF and is readable before you submit it.
- Deadline of the submission: Sunday, Feb. 2, 11:59 pm. Total marks: 20.

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1. Solve the following linear system of equations.

$$\begin{cases} x + 3y - z + t = 0 \\ 3x - y + 2z + t = 0 \\ -x + 5y - z + 2t = 0 \end{cases}$$

2. For which values of the parameters $k, l \in \mathcal{R}$ does the system have no solution, unique solution or infinite solutions.

$$\begin{cases} 2x + \quad 6y = 5 \\ 4x + (k+15)y = l + 8 \end{cases}$$

3. Let $B = \begin{bmatrix} -2 & -4 & 3 \\ 2 & 2 & 1 \\ -2 & 2 & 1 \end{bmatrix}$. Use B^{-1} to solve $Bx = d$ where $d = \begin{bmatrix} 3 \\ -2 \\ -4 \end{bmatrix}$.

4. Let $u = \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix}$, $v = \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix}$ and $w = \begin{bmatrix} 2 \\ 3 \\ -5 \end{bmatrix}$. Check whether w is a linear combination of u and v.