Matrix Analysis Homework

Intereswing

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① is equivalent to

$$\begin{aligned} x_1 + \frac{4}{3}x_2 - \frac{5}{3}x_3 + \frac{7}{3}x_4 = 0 \\ x_2 - \frac{19}{17}x_3 + \frac{20}{17}x_4 = 0 \end{aligned}$$

The solution is

$$\begin{aligned} x_1 &= \frac{3}{17}x_3 - \frac{13}{17}x_4 \\ x_2 &= \frac{19}{17}x_3 - \frac{20}{17}x_4 \end{aligned}$$

So

$$\begin{aligned} V_1 &= \mathrm{span}\{[\frac{3}{17} \quad \frac{19}{17} \quad 1 \quad 0]^\top, [-\frac{13}{17} \quad -\frac{20}{17} \quad 0 \quad 1]^\top\} \\ &= \mathrm{span}\{[3 \quad 19 \quad 17 \quad 0]^\top, [-13 \quad -20 \quad 0 \quad 17]^\top\} \end{aligned}$$

Similarly, it can be derived that

$$V_2 = \mathrm{span}\{[3 \quad 19 \quad 17 \quad 0]^\top, [-13 \quad -20 \quad 0 \quad 17]^\top\}$$

(1) $V_1 + V_2 = \mathrm{span}\{[3 \quad 19 \quad 17 \quad 0]^\top, [-13 \quad -20 \quad 0 \quad 17]^\top\}$.
The basis of it is $[3 \quad 19 \quad 17 \quad 0]^\top$ and $[-13 \quad -20 \quad 0 \quad 17]^\top$.
The dimension of it is 2.
(2) $V_1 \cap V_2 = \mathrm{span}\{[3 \quad 19 \quad 17 \quad 0]^\top, [-13 \quad -20 \quad 0 \quad 17]^\top\}$.
The basis of it is $[3 \quad 19 \quad 17 \quad 0]^\top$ and $[-13 \quad -20 \quad 0 \quad 17]^\top$.
The dimension of it is 2.

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