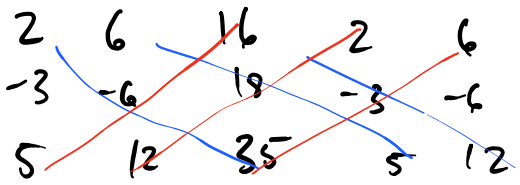
Question 1

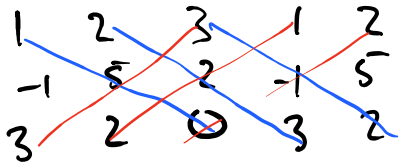
Sunday, November 12, 2023 3:11 PM

1. Compute the determinants of the following matrices:

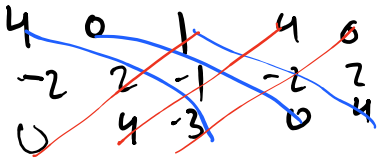
$$\begin{pmatrix} 2 & 6 & 16 \\ -3 & -6 & 18 \\ 5 & 12 & 35 \end{pmatrix}, \begin{pmatrix} 1 & 2 & 3 \\ -1 & 5 & 2 \\ 3 & 2 & 0 \end{pmatrix} \quad \begin{pmatrix} 4 & 0 & 1 \\ -2 & 2 & -1 \\ 0 & 4 & -3 \end{pmatrix}, \begin{pmatrix} 4 & -4 & 2 & 1 \\ 1 & 2 & 0 & 3 \\ 2 & 0 & 3 & 4 \\ 0 & -1 & 2 & 1 \end{pmatrix}$$



$-420 + 540 + -576 + 486 - 432 + 630 = \boxed{228}$



$0 + 12 - 6 - 45 - 4 - 0 = \boxed{-43}$



$-24 + 0 + -8 - 0 + 16 - 0 = \boxed{-16}$

$$\begin{pmatrix} 4 & -4 & 2 & 1 \\ 1 & 2 & 0 & 3 \\ 2 & 0 & 3 & 4 \\ 0 & -1 & 2 & 1 \end{pmatrix} \rightarrow \begin{matrix} 1 & 2 & 0 & 3 \\ 4 & -4 & 2 & 1 \\ 2 & 0 & 3 & 4 \\ 0 & -1 & 2 & 1 \end{matrix} \quad (-1)$$

$$\rightarrow \begin{matrix} 1 & 2 & 0 & 3 \\ 0 & -12 & 2 & -11 \\ 0 & -4 & 3 & -2 \end{matrix} \rightarrow \begin{matrix} 1 & 2 & 0 & 3 \\ 0 & -12 & 2 & -11 \\ 0 & 0 & \frac{7}{3} & \frac{56}{12} \end{matrix}$$

$1 + \frac{11}{12}$

$\frac{12}{12} + \frac{11}{12} = \frac{23}{12}$

$$\begin{matrix} 0 & -1 & 2 & 1 \end{matrix} \qquad \begin{matrix} 0 & 0 & 11/6 & 23/12 \end{matrix}$$

$$\begin{matrix} 1 & 2 & 0 & 3 \\ 0 & -12 & 2 & -11 \\ 0 & 0 & 7 & 5 \\ 0 & 0 & 22 & 23 \end{matrix} \xrightarrow{(36)} \begin{vmatrix} 1 & 2 & 0 & 3 \\ 0 & -12 & 2 & -11 \\ 0 & 0 & 7 & 5 \\ 0 & 0 & 0 & 51/7 \end{vmatrix}$$

$22 - \frac{22}{7}(7)$

$23 - \frac{22}{7}(5)$

$$\hookrightarrow 1 \cdot -12 \cdot 7 \cdot \frac{51}{7} = -612\left(-\frac{1}{1}\right)\left(\frac{1}{36}\right)$$

$$\boxed{= 17}$$