D S T Q Q S S

1) $\begin{vmatrix} 2x & 3y \\ 3 & 4 \end{vmatrix} = \begin{vmatrix} x+1 & 2y \\ 3 & y+4 \end{vmatrix}$

$2x = x+1$ $\quad$ $3y = 2y$

$2x - x = 1$ $\quad$ $\boxed{x = 1}$ $\quad$ $\boxed{y = 0}$

2-) a) $\begin{vmatrix} 1 & 5 & 7 \\ 3 & 9 & 11 \end{vmatrix} + \begin{vmatrix} 2 & 4 & 6 \\ 8 & 10 & 12 \end{vmatrix} + \begin{vmatrix} 0 & -1 & -5 \\ 1 & 4 & 7 \end{vmatrix}$

$= \begin{vmatrix} 3 & 8 & 8 \\ 12 & 23 & 30 \end{vmatrix}_{11}$

b) $\begin{vmatrix} 1 & 5 & 7 \\ 3 & 9 & 11 \end{vmatrix} - \begin{vmatrix} 2 & 4 & 6 \\ 8 & 10 & 12 \end{vmatrix} + \begin{vmatrix} 0 & -1 & -5 \\ 1 & 4 & 7 \end{vmatrix}$

$= \begin{vmatrix} -1 & 0 & -4 \\ -4 & 3 & 6 \end{vmatrix}_{11}$

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c) $\begin{vmatrix} 1 & 5 & 7 \\ 3 & 9 & 11 \end{vmatrix} - \begin{vmatrix} 2 & 4 & 6 \\ 8 & 10 & 12 \end{vmatrix} - \begin{vmatrix} 0 & -1 & -5 \\ 1 & 4 & 7 \end{vmatrix}$

$= \begin{vmatrix} -1 & 2 & 6 \\ -6 & -5 & -8 \end{vmatrix}_{11}$

d) $- \begin{vmatrix} 1 & 5 & 7 \\ 3 & 9 & 11 \end{vmatrix} + \begin{vmatrix} 2 & 4 & 6 \\ 8 & 10 & 12 \end{vmatrix} - \begin{vmatrix} 0 & -1 & -5 \\ 1 & 4 & 7 \end{vmatrix}$

$= \begin{vmatrix} 1 & 0 & 4 \\ 4 & -3 & -6 \end{vmatrix}_{11}$

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3.) a) $\begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix} \cdot \begin{vmatrix} 4 & 7 \\ 2 & 3 \end{vmatrix} =$

$= \begin{pmatrix} 0+2 & 0+3 \\ 4+0 & 7+0 \end{pmatrix} = \begin{vmatrix} 2 & 3 \\ 4 & 7 \end{vmatrix}$

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b) $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}_{3\times 1} \cdot \begin{bmatrix} 3 & 1 & 1 & 2 \end{bmatrix}_{1\times 4}$

$= \begin{bmatrix} 3 & 1 & 1 & 2 \\ 6 & 2 & 2 & 4 \\ 9 & 3 & 3 & 6 \end{bmatrix}_{3\times 4}$

c) $\begin{bmatrix} 1 & 5 & 2 \\ -1 & 4 & 7 \end{bmatrix}_{2\times 3} \cdot \begin{bmatrix} 1 & -1 \\ 2 & 3 \\ -3 & 0 \end{bmatrix}_{3\times 2} = \begin{bmatrix} 1+10+(-6) & -1+15+0 \\ -1+8-21 & 1+12+0 \end{bmatrix}$

$= \begin{bmatrix} 5 & 14 \\ -14 & 13 \end{bmatrix}$

d) $\begin{bmatrix} 1 & -1 & 5 & 0 \\ 2 & 3 & 7 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 1 \\ 2 & 1 \\ 3 & 1 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 14 & 5 \\ 30 & 13 \end{bmatrix}$

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c) $\begin{vmatrix} 1 & -1 \\ 2 & 2 \\ 3 & 4 \end{vmatrix}_{3\times 2} \cdot \begin{vmatrix} 1 & 2 & 3 \\ 4 & -5 & 1 \end{vmatrix}_{2\times 3} = \begin{vmatrix} 1-4 & 2+5 & 3-1 \\ 2+8 & 4-10 & 6+2 \\ 3+16 & 6-20 & 9+4 \end{vmatrix}$

$= \begin{vmatrix} -3 & 7 & 2 \\ 10 & -6 & 8 \\ 19 & -14 & 13 \end{vmatrix}$

d) $\begin{vmatrix} 0 & 1 & 1 \\ 2 & 2 & 0 \\ 0 & 3 & 4 \end{vmatrix} \cdot \begin{vmatrix} 1 & 4 & 7 \\ 0 & 0 & 1 \\ 1 & 2 & 0 \end{vmatrix} = \begin{vmatrix} 0+0+1 & 0+0+2 & 0+1+0 \\ 2+0+0 & 8+0+0 & 14+2+0 \\ 0+0+4 & 0+0+8 & 0+3+0 \end{vmatrix}$

$= \begin{vmatrix} 1 & 2 & 1 \\ 2 & 8 & 16 \\ 4 & 8 & 3 \end{vmatrix}$

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4-) a) $\begin{cases} x + 2y + 4z = 1 \\ 3x + y + 2z = -2 \\ -x + 3y - 2z = 0 \end{cases}$

$x + 2y + 4z = 1$

$7y + 10z = 5$

$36z = 18$

$l_2 = -3l_1 + l_2$

$-3x - 6y - 12z = -3$

$3x - y + 2z = -2$

$-7y - 10z = -5 \quad (\cdot -1)$

$l_3 = l_1 + l_3$

$5y + 2z = 1$

$l_3 = 5l_2 + -7l_3$

$+35y + 50z = 25$

$-35y - 14z = -7$

$+36z = 18$

$z = \frac{18}{36} = \frac{1}{2}$

$7y + 10 \cdot \frac{1}{2} = 5$

$7y = 0 \Rightarrow y = 0$

$x + 2 \cdot 0 + 4 \cdot \frac{1}{2} = 1$

$x + 2 = 1$

$x = -1$

$S = \left(-1, 0, \frac{1}{2}\right)$ //

b) $\begin{cases} x + y = -1 \\ 2x - y - 3z = -2 \\ 5x + 2y - z = -5 \end{cases}$ $\begin{cases} x + y + 0z = 1 \\ -3y - 3z = 0 \end{cases}$

$l_2 = -2l_1 + l_2$

$-2x - 2y = 2$

$2x - y - 3z = -2$

$-3y - 3z = 0$

$l_3 = -5l_1 + l_3$

$-5x - 5y = 5$

$5x + 2y - z = -5$

$-3y - z = 0$

$l_3 = -1l_2 + l_3$

$3y + 3z = 0$

$-3y - z = 0$

$2 = 0$

$y = 3y - 3(0) = 0$

$y = 0/3 = 0$

$x + 0 + 0 = -1$

$S = (-1, 0, 0)$

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c) $\begin{cases} 3x + y + 2z = -3 \\ 2x + 2y - z = 1 \\ 4x + 3y + 3z = 3 \end{cases}$ $\begin{cases} 3x + y + 2z = -3 \\ 4y - 7z = 9 \end{cases}$

$l_2 = -2l_1 + 3l_2$

$-6x - 2y - 4z = 6$

$+ \quad 6x + 6y - 3z = 3$

$4y - 7z = 9$

$l_3 = -4l_1 + 3l_3$

$-12x - 4y - 8z = 12$

$12x + 9y + 9z = 9$

$5y + z = 21$

$l_3 = -5l_2 + 4l_3$

$-20y + 35z = 45$

$20y + 4z = 84$

$39z = 39$

$z = 1$ //

$4y - 7 \cdot 1 = 9$

$4y - 7 = 9$

$4y = 16$

$y = 4$ //

$3x + 4 + 2 = -3$

$3x = -9$

$x = -3$ //