

## 代幾 I 計算演習 (2005/07/07)

サラスの展開 (Text の p.27) を利用して以下の行列式を求めなさい。

問 1.

$$\begin{vmatrix} -3 & 4 & 2 \\ -3 & 4 & -4 \\ 5 & -4 & -1 \end{vmatrix}$$

問 2.

$$\begin{vmatrix} 1 & 5 & -5 \\ 1 & 1 & 4 \\ 3 & 2 & 2 \end{vmatrix}$$

問 3.

$$\begin{vmatrix} -4 & -5 & 2 \\ 2 & -4 & 4 \\ -2 & -2 & 2 \end{vmatrix}$$

問 4.

$$\begin{vmatrix} -3 & -5 & -2 \\ 5 & -5 & -3 \\ -1 & -3 & 4 \end{vmatrix}$$

問 5.

$$\begin{vmatrix} 1 & -4 & -5 \\ 5 & 0 & 3 \\ 5 & -5 & -1 \end{vmatrix}$$

問 6.

$$\begin{vmatrix} 1 & 2 & 4 \\ -3 & 3 & 4 \\ 4 & -1 & 3 \end{vmatrix}$$

問 7.

$$\begin{vmatrix} 1 & 0 & -4 \\ -5 & 2 & -4 \\ -1 & 0 & 5 \end{vmatrix}$$

問 8.

$$\begin{vmatrix} -1 & 4 & -3 \\ -3 & -3 & -4 \\ -5 & -4 & 2 \end{vmatrix}$$

問 9.

$$\begin{vmatrix} 4 & 5 & 0 \\ -5 & -2 & -4 \\ 4 & 1 & 2 \end{vmatrix}$$

問 10.

$$\begin{vmatrix} 0 & -3 & 4 \\ -2 & 1 & -1 \\ -3 & 2 & 4 \end{vmatrix}$$

問 11.

$$\begin{vmatrix} -4 & 4 & -4 \\ -5 & -5 & 4 \\ -5 & -3 & -5 \end{vmatrix}$$

問 12.

$$\begin{vmatrix} -3 & -2 & -5 \\ 2 & 5 & 3 \\ -4 & 5 & -5 \end{vmatrix}$$

解答

答 1.

$$\begin{vmatrix} -3 & 4 & 2 \\ -3 & 4 & -4 \\ 5 & -4 & -1 \end{vmatrix} = \begin{aligned} & (-3) \times 4 \times (-1) + 4 \times (-4) \times 5 + 2 \times (-3) \times (-4) \\ & - (-3) \times (-4) \times (-4) - 4 \times (-3) \times (-1) - 2 \times 4 \times 5 \end{aligned} \\ = -48$$

答 2.

$$\begin{vmatrix} 1 & 5 & -5 \\ 1 & 1 & 4 \\ 3 & 2 & 2 \end{vmatrix} = \begin{aligned} & 1 \times 1 \times 2 + 5 \times 4 \times 3 + (-5) \times 1 \times 2 \\ & - 1 \times 4 \times 2 - 5 \times 1 \times 2 - (-5) \times 1 \times 3 \end{aligned} \\ = 49$$

答 3.

$$\begin{vmatrix} -4 & -5 & 2 \\ 2 & -4 & 4 \\ -2 & -2 & 2 \end{vmatrix} = \begin{aligned} & (-4) \times (-4) \times 2 + (-5) \times 4 \times (-2) + 2 \times 2 \times (-2) \\ & - (-4) \times 4 \times (-2) - (-5) \times 2 \times 2 - 2 \times (-4) \times (-2) \end{aligned} \\ = 36$$

答 4.

$$\begin{vmatrix} -3 & -5 & -2 \\ 5 & -5 & -3 \\ -1 & -3 & 4 \end{vmatrix} = \begin{aligned} & (-3) \times (-5) \times 4 + (-5) \times (-3) \times (-1) + (-2) \times 5 \times (-3) \\ & - (-3) \times (-3) \times (-3) - (-5) \times 5 \times 4 - (-2) \times (-5) \times (-1) \end{aligned} \\ = 212$$

答 5.

$$\begin{vmatrix} 1 & -4 & -5 \\ 5 & 0 & 3 \\ 5 & -5 & -1 \end{vmatrix} = \begin{aligned} & 1 \times 0 \times (-1) + (-4) \times 3 \times 5 + (-5) \times 5 \times (-5) \\ & - 1 \times 3 \times (-5) - (-4) \times 5 \times (-1) - (-5) \times 0 \times 5 \end{aligned} \\ = 60$$

答 6.

$$\begin{vmatrix} 1 & 2 & 4 \\ -3 & 3 & 4 \\ 4 & -1 & 3 \end{vmatrix} = \begin{aligned} & 1 \times 3 \times 3 + 2 \times 4 \times 4 + 4 \times (-3) \times (-1) \\ & - 1 \times 4 \times (-1) - 2 \times (-3) \times 3 - 4 \times 3 \times 4 \end{aligned} \\ = 27$$

答 7.

$$\begin{vmatrix} 1 & 0 & -4 \\ -5 & 2 & -4 \\ -1 & 0 & 5 \end{vmatrix} = \begin{array}{l} 1 \times 2 \times 5 \quad + \quad 0 \times (-4) \times (-1) \quad + \quad (-4) \times (-5) \times 0 \\ - \quad 1 \times (-4) \times 0 \quad - \quad 0 \times (-5) \times 5 \quad - \quad (-4) \times 2 \times (-1) \end{array} \\ = 2$$

答 8.

$$\begin{vmatrix} -1 & 4 & -3 \\ -3 & -3 & -4 \\ -5 & -4 & 2 \end{vmatrix} = \begin{array}{l} (-1) \times (-3) \times 2 \quad + \quad 4 \times (-4) \times (-5) \quad + \quad (-3) \times (-3) \times (-4) \\ - \quad (-1) \times (-4) \times (-4) \quad - \quad 4 \times (-3) \times 2 \quad - \quad (-3) \times (-3) \times (-5) \end{array} \\ = 135$$

答 9.

$$\begin{vmatrix} 4 & 5 & 0 \\ -5 & -2 & -4 \\ 4 & 1 & 2 \end{vmatrix} = \begin{array}{l} 4 \times (-2) \times 2 \quad + \quad 5 \times (-4) \times 4 \quad + \quad 0 \times (-5) \times 1 \\ - \quad 4 \times (-4) \times 1 \quad - \quad 5 \times (-5) \times 2 \quad - \quad 0 \times (-2) \times 4 \end{array} \\ = -30$$

答 10.

$$\begin{vmatrix} 0 & -3 & 4 \\ -2 & 1 & -1 \\ -3 & 2 & 4 \end{vmatrix} = \begin{array}{l} 0 \times 1 \times 4 \quad + \quad (-3) \times (-1) \times (-3) \quad + \quad 4 \times (-2) \times 2 \\ - \quad 0 \times (-1) \times 2 \quad - \quad (-3) \times (-2) \times 4 \quad - \quad 4 \times 1 \times (-3) \end{array} \\ = -37$$

答 11.

$$\begin{vmatrix} -4 & 4 & -4 \\ -5 & -5 & 4 \\ -5 & -3 & -5 \end{vmatrix} = \begin{array}{l} (-4) \times (-5) \times (-5) \quad + \quad 4 \times 4 \times (-5) \quad + \quad (-4) \times (-5) \times (-3) \\ - \quad (-4) \times 4 \times (-3) \quad - \quad 4 \times (-5) \times (-5) \quad - \quad (-4) \times (-5) \times (-5) \end{array} \\ = -288$$

答 12.

$$\begin{vmatrix} -3 & -2 & -5 \\ 2 & 5 & 3 \\ -4 & 5 & -5 \end{vmatrix} = \begin{array}{l} (-3) \times 5 \times (-5) \quad + \quad (-2) \times 3 \times (-4) \quad + \quad (-5) \times 2 \times 5 \\ - \quad (-3) \times 3 \times 5 \quad - \quad (-2) \times 2 \times (-5) \quad - \quad (-5) \times 5 \times (-4) \end{array} \\ = -26$$