

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.

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

問 2.

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

問 3.

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

問 4.

$$\begin{vmatrix} -5 & -3 & -3 \\ 3 & -5 & -4 \\ 3 & 0 & -2 \end{vmatrix}$$

問 5.

$$\begin{vmatrix} 3 & -2 & -5 \\ 4 & 0 & 1 \\ 1 & -5 & 2 \end{vmatrix}$$

問 6.

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

問 7.

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

問 8.

$$\begin{vmatrix} 3 & -2 & -2 \\ -5 & 5 & 0 \\ -5 & 1 & 5 \end{vmatrix}$$

問 9.

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

問 10.

$$\begin{vmatrix} 2 & 1 & -5 \\ 0 & 3 & -4 \\ 0 & -4 & 5 \end{vmatrix}$$

問 11.

$$\begin{vmatrix} 0 & 5 & 0 \\ -2 & 0 & 3 \\ 1 & 0 & 0 \end{vmatrix}$$

問 12.

$$\begin{vmatrix} -5 & -2 & -5 \\ 3 & 1 & -5 \\ 0 & 1 & -1 \end{vmatrix}$$

解答

答 1.

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

答 2.

$$\begin{vmatrix} -2 & 1 & 5 \\ 3 & -2 & 2 \\ -3 & -3 & 1 \end{vmatrix} = \begin{aligned} & (-2) \times (-2) \times 1 + 1 \times 2 \times (-3) + 5 \times 3 \times (-3) \\ & - (-2) \times 2 \times (-3) - 1 \times 3 \times 1 - 5 \times (-2) \times (-3) \end{aligned}$$
$$= -92$$

答 3.

$$\begin{vmatrix} 0 & -3 & -2 \\ -2 & -4 & 0 \\ 0 & -4 & -1 \end{vmatrix} = \begin{aligned} & 0 \times (-4) \times (-1) + (-3) \times 0 \times 0 + (-2) \times (-2) \times (-4) \\ & - 0 \times 0 \times (-4) - (-3) \times (-2) \times (-1) - (-2) \times (-4) \times 0 \end{aligned}$$
$$= -10$$

答 4.

$$\begin{vmatrix} -5 & -3 & -3 \\ 3 & -5 & -4 \\ 3 & 0 & -2 \end{vmatrix} = \begin{aligned} & (-5) \times (-5) \times (-2) + (-3) \times (-4) \times 3 + (-3) \times 3 \times 0 \\ & - (-5) \times (-4) \times 0 - (-3) \times 3 \times (-2) - (-3) \times (-5) \times 3 \end{aligned}$$
$$= -77$$

答 5.

$$\begin{vmatrix} 3 & -2 & -5 \\ 4 & 0 & 1 \\ 1 & -5 & 2 \end{vmatrix} = \begin{aligned} & 3 \times 0 \times 2 + (-2) \times 1 \times 1 + (-5) \times 4 \times (-5) \\ & - 3 \times 1 \times (-5) - (-2) \times 4 \times 2 - (-5) \times 0 \times 1 \end{aligned}$$
$$= 129$$

答 6.

$$\begin{vmatrix} -2 & -3 & 3 \\ 2 & 1 & 5 \\ 3 & 2 & -5 \end{vmatrix} = \begin{aligned} & (-2) \times 1 \times (-5) + (-3) \times 5 \times 3 + 3 \times 2 \times 2 \\ & - (-2) \times 5 \times 2 - (-3) \times 2 \times (-5) - 3 \times 1 \times 3 \end{aligned}$$
$$= -42$$

答 7.

$$\begin{vmatrix} -3 & -4 & 5 \\ 1 & 5 & -3 \\ 3 & 1 & -5 \end{vmatrix} = \begin{aligned} & (-3) \times 5 \times (-5) + (-4) \times (-3) \times 3 + 5 \times 1 \times 1 \\ & - (-3) \times (-3) \times 1 - (-4) \times 1 \times (-5) - 5 \times 5 \times 3 \end{aligned} \\ = 12$$

答 8.

$$\begin{vmatrix} 3 & -2 & -2 \\ -5 & 5 & 0 \\ -5 & 1 & 5 \end{vmatrix} = \begin{aligned} & 3 \times 5 \times 5 + (-2) \times 0 \times (-5) + (-2) \times (-5) \times 1 \\ & - 3 \times 0 \times 1 - (-2) \times (-5) \times 5 - (-2) \times 5 \times (-5) \end{aligned} \\ = -15$$

答 9.

$$\begin{vmatrix} 0 & -4 & 5 \\ 5 & -1 & 5 \\ 2 & 4 & 0 \end{vmatrix} = \begin{aligned} & 0 \times (-1) \times 0 + (-4) \times 5 \times 2 + 5 \times 5 \times 4 \\ & - 0 \times 5 \times 4 - (-4) \times 5 \times 0 - 5 \times (-1) \times 2 \end{aligned} \\ = 70$$

答 10.

$$\begin{vmatrix} 2 & 1 & -5 \\ 0 & 3 & -4 \\ 0 & -4 & 5 \end{vmatrix} = \begin{aligned} & 2 \times 3 \times 5 + 1 \times (-4) \times 0 + (-5) \times 0 \times (-4) \\ & - 2 \times (-4) \times (-4) - 1 \times 0 \times 5 - (-5) \times 3 \times 0 \end{aligned} \\ = -2$$

答 11.

$$\begin{vmatrix} 0 & 5 & 0 \\ -2 & 0 & 3 \\ 1 & 0 & 0 \end{vmatrix} = \begin{aligned} & 0 \times 0 \times 0 + 5 \times 3 \times 1 + 0 \times (-2) \times 0 \\ & - 0 \times 3 \times 0 - 5 \times (-2) \times 0 - 0 \times 0 \times 1 \end{aligned} \\ = 15$$

答 12.

$$\begin{vmatrix} -5 & -2 & -5 \\ 3 & 1 & -5 \\ 0 & 1 & -1 \end{vmatrix} = \begin{aligned} & (-5) \times 1 \times (-1) + (-2) \times (-5) \times 0 + (-5) \times 3 \times 1 \\ & - (-5) \times (-5) \times 1 - (-2) \times 3 \times (-1) - (-5) \times 1 \times 0 \end{aligned} \\ = -41$$