

# 代数学幾何学 (A/B) 計算演習 [問題] (2009/11/05)

問. 次の行列の行列式を求めなさい

Q.1

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

Q.7

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

Q.2

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

Q.8

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

Q.3

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

Q.9

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

Q.4

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

Q.10

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

Q.5

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

Q.11

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

Q.6

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

Q.12

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

代数学幾何学 (A/B) 計算演習 [解答] (2009/11/05)

A.1

$$\begin{vmatrix} -1 & 2 & 0 & 0 \\ 1 & 2 & 2 & -1 \\ 2 & 1 & -2 & 2 \\ -2 & 0 & -1 & 2 \end{vmatrix} = 31$$

A.7

$$\begin{vmatrix} -1 & -1 & 1 & -2 \\ -2 & -1 & -2 & 1 \\ -2 & -2 & 2 & -1 \\ 2 & -1 & -2 & -1 \end{vmatrix} = -36$$

A.2

$$\begin{vmatrix} 1 & 2 & 1 & 0 \\ 2 & 2 & 2 & -2 \\ 2 & -1 & 2 & 1 \\ 1 & -2 & 2 & -2 \end{vmatrix} = 12$$

A.8

$$\begin{vmatrix} -2 & 0 & -1 & 2 \\ -1 & 1 & -1 & 1 \\ 2 & -1 & 0 & 0 \\ -1 & 1 & 2 & 2 \end{vmatrix} = 15$$

A.3

$$\begin{vmatrix} 1 & 1 & 2 & 2 \\ -1 & -1 & -2 & 2 \\ -1 & 2 & -1 & -1 \\ -1 & -2 & 1 & 0 \end{vmatrix} = 40$$

A.9

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

A.4

$$\begin{vmatrix} 2 & -1 & 1 & -1 \\ -1 & 2 & 0 & 1 \\ 1 & 1 & 0 & 2 \\ -1 & -2 & 0 & 1 \end{vmatrix} = -12$$

A.10

$$\begin{vmatrix} 2 & 0 & 1 & 1 \\ 2 & 0 & 0 & -2 \\ 2 & 2 & 1 & 2 \\ -1 & -1 & 1 & 0 \end{vmatrix} = -14$$

A.5

$$\begin{vmatrix} 2 & 0 & -2 & 2 \\ 2 & 1 & -1 & -1 \\ -1 & 1 & -1 & -2 \\ -1 & 0 & 1 & 2 \end{vmatrix} = -18$$

A.11

$$\begin{vmatrix} -1 & 0 & -1 & 0 \\ 2 & 1 & 0 & -2 \\ -1 & 2 & 1 & 1 \\ -1 & -2 & 1 & -1 \end{vmatrix} = 20$$

A.6

$$\begin{vmatrix} 0 & -1 & 2 & 1 \\ 0 & 1 & 2 & -1 \\ -1 & 0 & 0 & -2 \\ 2 & 2 & -2 & 0 \end{vmatrix} = -8$$

A.12

$$\begin{vmatrix} 1 & -1 & -1 & 1 \\ -1 & 1 & -1 & -2 \\ 2 & -2 & 2 & 2 \\ 0 & 2 & 0 & -2 \end{vmatrix} = 8$$