代幾 I 計算演習 [問題] (2006/11/30)

問. 次の行列の行列式を求めなさい

Q.1

$$\begin{vmatrix} 0 & -3 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\ 2 & -2 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\ -3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3 & 8 & -4 & 3 & -2 & 0 & 0 & 0 & 0 \\ -4 & -6 & -4 & -2 & 2 & 0 & 0 & 0 & 0 \\ 1 & -5 & 1 & 9 & -9 & -2 & 0 & -1 & 0 \\ -9 & -2 & 4 & 3 & 0 & -3 & -2 & -1 & 0 \\ 4 & -7 & 9 & -3 & 5 & -2 & -2 & 0 & 0 \\ 2 & 4 & 2 & -8 & 4 & -8 & 9 & 5 & 4 \end{vmatrix}$$

Q.2

$$\begin{vmatrix} 1 & 0 & -2 & 0 & 0 \\ 1 & -1 & 0 & 0 & 0 \\ 0 & 2 & -3 & 0 & 0 \\ 5 & -7 & -4 & 1 & 3 \\ 9 & -5 & -1 & 2 & 0 \end{vmatrix}$$

Q.3

$$\begin{vmatrix} -2 & 1 & 0 & 0 & 0 & 0 \\ 5 & 2 & 0 & 0 & 0 & 0 \\ -5 & -4 & 2 & -2 & 2 & 0 \\ -5 & 7 & 0 & 2 & 2 & 0 \\ 0 & 4 & 2 & 0 & 1 & 0 \\ -5 & -3 & 5 & -2 & 4 & 2 \end{vmatrix}$$

Q.4

$$\begin{vmatrix} -2 & -1 & -2 & 0 & 0 & 0 & 0 & 0 & 0 \\ -2 & 1 & -2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 9 & -5 & -7 & 3 & -2 & 0 & 0 & 0 & 0 \\ -7 & -1 & 3 & 4 & -1 & 0 & 0 & 0 & 0 \\ 0 & 3 & -6 & 4 & 5 & -5 & 1 & 0 & 0 \\ -1 & -2 & -1 & -9 & 5 & -1 & 5 & 0 & 0 \\ 0 & 6 & -5 & 3 & -7 & 2 & 2 & 5 & 5 \\ 1 & 9 & 2 & 4 & -7 & -6 & 7 & 4 & 4 \end{vmatrix}$$

Q.5

$$\begin{vmatrix} -2 & -2 & 3 & 0 & 0 & 0 & 0 \\ 0 & 3 & -2 & 0 & 0 & 0 & 0 \\ 0 & 1 & -2 & 0 & 0 & 0 & 0 \\ 2 & 7 & -8 & 0 & 1 & 0 & 0 \\ -2 & -3 & 1 & -3 & 5 & 0 & 0 \\ 1 & 5 & -7 & -8 & -1 & -4 & -2 \\ 3 & 1 & -8 & -5 & -5 & 2 & -5 \end{vmatrix}$$

Q.6

$$\begin{vmatrix} 0 & -2 & 0 & 0 & 0 & 0 & 0 \\ 0 & -2 & -2 & 0 & 0 & 0 & 0 \\ 2 & 1 & -1 & 0 & 0 & 0 & 0 \\ 3 & 9 & 1 & -3 & -2 & -2 & 0 \\ 7 & -4 & 7 & -1 & 1 & 1 & 0 \\ 9 & -7 & -2 & -2 & 3 & 2 & 0 \\ 1 & 5 & -3 & 5 & 6 & -7 & 10 \end{vmatrix}$$

Q.7

$$\begin{vmatrix} 2 & 4 & 5 & 5 & -2 & 4 & -7 & -2 & 3 \\ 0 & 2 & -3 & 0 & -1 & 0 & -2 & 2 & 0 \\ 0 & -1 & -3 & 3 & 5 & 8 & 3 & 2 & -8 \\ 0 & 1 & 1 & 1 & -7 & -4 & 3 & 6 & 1 \\ 0 & 0 & 0 & 0 & 1 & -2 & 2 & 4 & -5 \\ 0 & 0 & 0 & 0 & -2 & -2 & 2 & 1 & -9 \\ 0 & 0 & 0 & 0 & 1 & -1 & -3 & -7 & 2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -2 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 5 & -5 \end{vmatrix}$$

代幾 I 計算演習 [解答] (2006/11/30)

A.1

$$\begin{aligned}
\text{与式} &= \begin{vmatrix} 0 & -3 & 3 \\ 2 & -2 & 3 \\ -3 & 0 & 0 \end{vmatrix} \times \begin{vmatrix} 3 & -2 \\ -2 & 2 \end{vmatrix} \times \begin{vmatrix} -2 & 0 & -1 \\ -3 & -2 & -1 \\ -2 & -2 & 0 \end{vmatrix} \times 4 \\
&= 9 \times 2 \times 2 \times 4 \\
&= 144
\end{aligned}$$

A.2

$$\begin{aligned}
\text{与式} &= \begin{vmatrix} 1 & 0 & -2 \\ 1 & -1 & 0 \\ 0 & 2 & -3 \end{vmatrix} \times \begin{vmatrix} 1 & 3 \\ 2 & 0 \end{vmatrix} \\
&= (-1) \times (-6) \\
&= 6
\end{aligned}$$

A.3

$$\begin{aligned}
\text{与式} &= \begin{vmatrix} -2 & 1 \\ 5 & 2 \end{vmatrix} \times \begin{vmatrix} 2 & -2 & 2 \\ 0 & 2 & 2 \\ 2 & 0 & 1 \end{vmatrix} \times 2 \\
&= (-9) \times (-12) \times 2 \\
&= 216
\end{aligned}$$

A.4

$$\begin{aligned}
\text{与式} &= \begin{vmatrix} -2 & -1 & -2 \\ -2 & 1 & -2 \\ 0 & -1 & 2 \end{vmatrix} \times \begin{vmatrix} 3 & -2 \\ 4 & -1 \end{vmatrix} \times \begin{vmatrix} -5 & 1 \\ -1 & 5 \end{vmatrix} \times \begin{vmatrix} 5 & 5 \\ 4 & 4 \end{vmatrix} \\
&= (-8) \times 5 \times (-24) \times 0 \\
&= 0
\end{aligned}$$

A.5

$$\begin{aligned}
\text{与式} &= \begin{vmatrix} -2 & -2 & 3 \\ 0 & 3 & -2 \\ 0 & 1 & -2 \end{vmatrix} \times \begin{vmatrix} 0 & 1 \\ -3 & 5 \end{vmatrix} \times \begin{vmatrix} -4 & -2 \\ 2 & -5 \end{vmatrix} \\
&= 8 \times 3 \times 24 \\
&= 576
\end{aligned}$$

A.6

$$
\begin{aligned}
\text{与式} &= \begin{vmatrix} 0 & -2 & 0 \\ 0 & -2 & -2 \\ 2 & 1 & -1 \end{vmatrix} \times \begin{vmatrix} -3 & -2 & -2 \\ -1 & 1 & 1 \\ -2 & 3 & 2 \end{vmatrix} \times 10 \\
&= 8 \times 5 \times 10 \\
&= 400
\end{aligned}
$$

A.7

$$
\begin{aligned}
\text{与式} &= 2 \times \begin{vmatrix} 2 & -3 & 0 \\ -1 & -3 & 3 \\ 1 & 1 & 1 \end{vmatrix} \times \begin{vmatrix} 1 & -2 & 2 \\ -2 & -2 & 2 \\ 1 & -1 & -3 \end{vmatrix} \times \begin{vmatrix} -2 & -1 \\ 5 & -5 \end{vmatrix} \\
&= 2 \times (-24) \times 24 \times 15 \\
&= -17280
\end{aligned}
$$