Name Key

Mathematics 1553

Quiz 7
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Section HP1 / HP2
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1. Compute the determinant of the following matrix:

$$A = \begin{pmatrix} 3 & 1 & 0 \\ -1 & 2 & 2 \\ 5 & 0 & -1 \end{pmatrix}$$

$$\det A = 0 \cdot \begin{vmatrix} -1 & 2 \\ 5 & 0 \end{vmatrix} - 2 \begin{vmatrix} 3 & 1 \\ 5 & 0 \end{vmatrix} + (-1) \begin{vmatrix} 3 & 1 \\ -1 & 2 \end{vmatrix} = 0 - 2 \cdot (-5) + (-1) \cdot 7$$
$$= \boxed{3}$$

Compute the determinant of the following matrix:

$$B = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 8 & 5 & 0 & 0 \\ -2 & -9 & 2 & 0 \\ 7 & 8 & -1 & 7 \end{pmatrix}$$

① Since B is lower triangular matrix, $\det B$ = product of its diagonal entries.

$\det B = 1 \cdot 5 \cdot 2 \cdot 7 = 70$

② $$\det B = 1 \cdot \begin{vmatrix} 5 & 0 & 0 \\ -9 & 2 & 0 \\ 8 & -1 & 7 \end{vmatrix} = 1 \cdot 5 \cdot \begin{vmatrix} 2 & 0 \\ -1 & 7 \end{vmatrix} = 1 \cdot 5 \cdot 2 \cdot |7|$$
$$= \boxed{70}$$

Compute the determinant of the following matrix:

$$C = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\det C = (-1)^{5+1} \det \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} = 1 \cdot 1 = 1$$