Name SOLUTION

Mathematics 1553

Quiz 6

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1. Find the determinant of the following matrix:

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

$$+2 \det \begin{pmatrix} 0 & 3 & -1 \\ 3 & 1 & 2 \\ 0 & 1 & 4 \end{pmatrix}$$

$$= 2(-3) \det \begin{pmatrix} 3 & -1 \\ 1 & 4 \end{pmatrix}$$

$$= 2(-3)(13) = -78$$

Turn the page over!

2. Consider the matrices

$$A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} d & e & f \\ a+d & b+e & c+f \\ 2g & 2h & 2i \end{pmatrix}$$

Suppose that $\det A = 3$. What is the determinant of B?

1 row swap : -1

1 row rep : $+1$

1 row scale : 2

$3(-1)(+1)(2) = \boxed{-6}$

3. Suppose A is a 3×3 matrix with $\det A = -1$ and say $T(v) = Av$. Which of the following statements can we conclude? Select all that apply.

(a) A is the negative of the identity matrix

(b) A is invertible

(c) the parallelepiped spanned by the rows of A has volume 1

(d) if S is a subset of $\mathbb{R}^3$ with volume 10 then the volume of $T(S)$ is 10

(e) the determinant of $-A$ is 1

(f) for every 3×3 matrix B we have $\det AB = -\det B$