

Quiz 8

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §2.2 #26 (5 marks) Evaluate the determinant

$$\det \begin{pmatrix} a & b & c \\ 2d & 2e & 2f \\ g+3a & h+3b & i+3c \end{pmatrix} \quad A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} \sim \begin{matrix} 2R_2 \rightarrow R_2 \\ 3R_1 + R_3 \rightarrow R_3 \end{matrix} \begin{bmatrix} a & b & c \\ 2d & 2e & 2f \\ g+3a & h+3b & i+3c \end{bmatrix}$$

given that

$$\det \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} = -6$$

||
B

(operations that change det.) $\det[\text{original matrix}] = \det[\text{new mat.}]$
 $(2) \det A = \det B$
 $2(-6) = \det B$
 $-12 = \det B$

Question 2. §2.2 #15 (5 marks) Using elem. op. find the det. of the following matrix.

$$A = \begin{bmatrix} 2 & 1 & 3 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 2 & 1 & 0 \\ 0 & 1 & 2 & 3 \end{bmatrix} \sim \begin{matrix} R_1 \leftrightarrow R_2 \\ R_3 \leftrightarrow R_4 \end{matrix} \begin{bmatrix} 1 & 0 & 1 & 1 \\ 2 & 1 & 3 & 1 \\ 0 & 1 & 2 & 3 \\ 0 & 2 & 1 & 0 \end{bmatrix} \sim \begin{matrix} -2R_1 + R_2 \rightarrow R_2 \\ -2R_1 + R_4 \rightarrow R_4 \end{matrix} \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \\ 0 & 1 & 2 & 3 \\ 0 & 2 & 1 & 0 \end{bmatrix}$$

(op. change det.) $\det A = \det B$
 $(-1)(-1) \det A = (1)(1)(1)(6)$ since \sim
 $\det A = 6$ B is triang.

$$\begin{matrix} -R_2 + R_3 \rightarrow R_3 \\ -2R_2 + R_4 \rightarrow R_4 \end{matrix} \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & -1 & 2 \end{bmatrix}$$

$$\sim \begin{matrix} R_3 + R_4 \rightarrow R_4 \end{matrix} \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 6 \end{bmatrix} = B$$