

## Quiz 6

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.** (5 marks) If

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

$$\sim \begin{matrix} -2R_1 + R_2 \rightarrow R_2 \\ 3R_4 \end{matrix} \begin{bmatrix} 1 & 1 & -2 & 1 & 0 \\ 0 & 1 & 5 & -2 & 0 \\ 0 & 0 & 3 & -2 & 1 \\ 0 & 0 & 6 & -15 & 9 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$$

then compute  $\det(A)$  using elementary operations.

$$\sim \begin{matrix} -2R_3 + R_4 \rightarrow R_4 \end{matrix} \begin{bmatrix} 1 & 1 & -2 & 1 & 0 \\ 0 & 1 & 5 & -2 & 0 \\ 0 & 0 & 3 & -2 & 1 \\ 0 & 0 & 0 & -11 & 9 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix} = B$$

$$\begin{aligned} \det B &= (3) \det A \\ (1)(1)(3)(-11)(2) &= 3 \det A \\ -22 &= \det A \end{aligned}$$

**Question 2.** (5 marks) If

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, B = \begin{bmatrix} -c & b+c & 3a \\ -f & e+f & 3d \\ -i & h+i & 3g \end{bmatrix}$$

and  $\det(A) = \sqrt{2}$  then compute  $\det(B)$ .

$$A \sim \begin{matrix} C_1 \leftrightarrow C_3 \\ -C_1 \quad C_1 + C_2 \rightarrow C_2 \\ 3C_3 \end{matrix} \begin{bmatrix} c & b & a \\ f & e & d \\ i & h & g \end{bmatrix} \sim \begin{bmatrix} -c & b+c & 3a \\ -f & e+f & 3d \\ -i & h+i & 3g \end{bmatrix} = B$$

$$\begin{aligned} \det B &= (-1)(-1)(3) \det A \\ &= 3\sqrt{2} \end{aligned}$$