Math115 Test 2: Determinants

Answer each question on a new sheet of paper, and do not erase anything. Show all working, reasoning and checks to achieve full marks. The number in square brackets indicates the number of marks available for each part of each question. Should you require a hint one may be given in return for a mark.

1. (a) Without using row or column operations find the value of y which ensures that A will be non-singular. [4]

$$A := \begin{pmatrix} 7 & -6 & 1 \\ -3 & y & -1 \\ x & 2 & 5 \end{pmatrix}$$

   (b) If $y := 2x - 4$, what values of x now will make A singular? [3]

   (c) Give two singular matrices which when added give a non-singular matrix and two singular matrices which when added give a singular matrix. [2]

2. (a) Find the inverse of this matrix using the adjoint method. [8]

$$B := \begin{pmatrix} w & 4 & 3 \\ 2 & 9 & 1 \\ 1 & 5 & 2 \end{pmatrix}$$

   (b) Use legal operations on B^{-1} and then a Laplace expansion to find its determinant. If you failed to get a correct answer for (a), just verify the determinant of B in the same way and explain what the determinant of B^{-1} should be. [3]