Math115 Test 1: Row Operations

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) Use row operations to find the inverse of this matrix. [8]

$$A := \begin{pmatrix} 6 & 5 & 4 \\ 4 & 5 & 5 \\ 5 & 3 & 3 \end{pmatrix}$$

   (b) Without doing any more row operations determine the solution to $A\underline{v} = \begin{pmatrix} 3 \\ 2 \\ -4 \end{pmatrix}$. [2]

2. (a) Using row operations to get to an equivalent of row echelon form and then backwards substitution find all solutions to this system of equations: [8]

$$\begin{aligned} 4\,w + 3\,x - 3\,y - 4\,z &= -5 \\ -2\,w - 2\,x + 2\,y + 4\,z &= 6 \\ 2\,w + 3\,x + 4\,y - z &= -6 \\ 3\,w + x + y + 4\,z &= 7 \end{aligned}$$

   (b) What are the largest and smallest possible ranks for an $m \times n$ matrix? Give an example of the RREF of each kind and explain why the rank is what you claim. [2]