Math115 Test 2

January 30, 2007

Answer all questions and give complete reasons and checks for your answers. The parts of the questions are weighted as shown spend an appropriate amount of time on each part. The questions can be answered in any order, please start a fresh side of your paper for each question.

1. (a) Using row operations show that the inverse of $A := \begin{pmatrix} 7 & -3 & 5 \\ 3 & 0 & 1 \\ 3 & 4 & -3 \end{pmatrix}$ is [8]

$$\frac{1}{4} \begin{pmatrix} 4 & -11 & 3 \\ -12 & 36 & -8 \\ -12 & 37 & -9 \end{pmatrix}.$$

(b) Use at least one determinant row or column operation and then find the determinant of A. [2]

(c) Without changing any row or column find the determinant of A^{-1} by a Laplace Expansion. [3]

2. (a) If $B := \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $C := \begin{pmatrix} p & q \\ r & s \end{pmatrix}$ show that $\det(BC) = \det(B)\det(C)$ by expanding both sides of the expression. [4]

(b) Use the above to explain why, if $\det(M) \neq 0$ then [2]

$$\det(M^{-1}) = \frac{1}{\det(M)}$$

(c) Deduce that if $\det(M) = 0$ then M has no inverse. [1]