MATH 301 – Quiz 5

You may work with other class members on this quiz, but you may not receive assistance from people not in MATH 301, Section 002. You must show all of your work to receive full credit. Do all your work on other sheets of paper and be sure to staple all the pieces of paper together or YOU WILL GET A ‘ZERO’ ON THE QUIZ. Do not use decimal approximations unless asked to do so. Your work on this quiz must be handed in by Friday, 14 March 2008 at the beginning of class. GOOD LUCK!

1) Let

\[ A = \begin{bmatrix} 6 & 7 & -2 & 4 \\ 4 & 4 & -1 & 4 \\ 8 & 6 & -1 & 12 \end{bmatrix}. \]

Do exercises a), b), c), and d) below in that order:

a) Find the null space of \( A \).

b) Find a basis for the null space of \( A \).

c) Determine the nullity and rank of \( A \).

d) Find the range of \( A \).

2) Let \( W \) be the subspace of \( \mathbb{R}^4 \) defined by

\[ W = \{ x : v^T x = 0 \} \]

where

\[ v = \begin{bmatrix} 1 \\ -3 \\ 5 \\ 2 \end{bmatrix}. \]

Find the dimension of \( W \).

3) Let \( A \) be an \( n \times n \) matrix. Show that \( A \) is nonsingular if and only if the nullity of \( A \) is zero.