5101 (AU 2017) **Homework 6** Name(s):

*Always justify your answers!*

**1.** For each of the following matrices

$$A = \begin{bmatrix} 1 & 2 \\ 4 & 8 \end{bmatrix},\ B = \begin{bmatrix} 1 & 2 \\ 0 & 0 \\ 2 & 1 \end{bmatrix},\ C = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

**a)** Find the null space.
**b)** Find the column space.
**c)** Is the matrix invertible? If so, find its inverse, and check your answer.
**d)** Does the matrix have a left inverse? If so, find one, and check your answer.
**e)** Does the matrix have a right inverse? If so, find one, and check your answer.

**2.** Construct a matrix which transforms the standard basis vectors $\mathbf{e}_1, \mathbf{e}_2, \mathbf{e}_3$ of $\mathbb{R}^3$ into three given vectors $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3 \in \mathbb{R}^3$. When is this matrix invertible?

**3.** Solve problems number 5.1.$n$ with $n \in \{\, 1,\ 2,\ 3,\ 4,\ 5,\ 7,\ 11,\ 12,\ 13\}$ from the posted handout.