Math 430 Fall 2016 Homework #9

Due Nov. 8, Tue in class

1. Textbook, Section 5.3, page 292: 2(a), 4;

2. Textbook, Section 5.4, page 303: 12, 13(a);

3. Use the Gram-Schmidt procedure to construct an orthonormal basis from the following basis for $\mathbb{R}^3$:
$$\left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \right\}.$$

4. Let A be an $m \times n$ real matrix. Show that for any vectors $x \in R(A)$ and $y \in N(A^T)$, x is orthogonal to y.

5. Let A be an $n \times n$ real matrix such that $AA^T = A^T A$. Show that for any vectors $x \in R(A)$ and $y \in N(A)$, x is orthogonal to y. (*Hint*: use equations (4.5.5) and (4.5.6) in the textbook.)