Math 430 Fall 2016 Homework #11

Due Nov. 22, Tue

1. Textbook, Section 5.11, page 409: 5(a,b), 14;

2. Textbook, Section 5.13, page 439: 3, 4, 5;

3. Suppose that $\mathcal{V} = \mathcal{X} \oplus \mathcal{Y}$, and let P be the projection operator onto $\mathcal{X}$ along $\mathcal{Y}$. Show that $R(P) = N(I - P)$.

4. Let a basis for the subspace $\mathcal{M}$ of $\mathbb{R}^4$ be

$$\left\{ \begin{pmatrix} 1 \\ 0 \\ 0 \\ -1 \end{pmatrix}, \begin{pmatrix} 1 \\ 2 \\ 0 \\ -1 \end{pmatrix}, \begin{pmatrix} 3 \\ 1 \\ 1 \\ -1 \end{pmatrix} \right\}.$$

   (1) Construct an orthonormal basis for $\mathcal{M}$. (*Hint*: use the Gram-Schmidt procedure.)

   (2) Construct a basis for $\mathcal{M}^\perp$.

   (3) Find the matrix representation of the orthogonal projector onto $\mathcal{M}$.