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# Linear Algebra

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## Homework #11

**Due Date:**

**Reading Assignment:** Chapter 6

**Problems:**

1. Exercises 6.1–1(i)
2. Exercises 6.1–4. (This exercise is as follows. Let  $V \subset \mathbb{R}^n$  be a subspace of  $\mathbb{R}^n$ , and let  $P : \mathbb{R}^n \rightarrow \mathbb{R}^n$  and  $R : \mathbb{R}^n \rightarrow \mathbb{R}^n$  be the linear transformations defined respectively by projecting onto and reflecting across  $V$ . Find the eigenvalues and eigenvectors of both  $P$  and  $R$ . For the answers of the eigenvectors, please give the eigenspace  $E(\lambda)$  for each eigenvalue  $\lambda$  of  $P$  and  $R$ .)
3. Exercises 6.1–9
4. Exercises 6.1–10(a) (Hint: it is true)
5. Exercises 6.2–11
6. Exercises 6.3–9
7.  $A$  and  $B$  are two  $n \times n$  matrices. Prove that  $AB$  and  $BA$  have the same set of eigenvalues by proving that a scalar  $\lambda \neq 0$  is an eigenvalue of  $AB$  if and only if it is an eigenvalue of  $BA$ . (Hint: consider  $\mathbf{y} = B\mathbf{x}$ , where  $AB\mathbf{x} = \lambda\mathbf{x}$ )