

Name:

1. For each of the following statements, write the word “true” or “false.”

(a) Let  $P$  be the orthogonal projection matrix for a subspace  $V$  of  $\mathbb{R}^n$ . Then  $NS(P - I_n) = V$ .

(b) Suppose  $A$  is an  $n \times n$  matrix such that  $AA^* = I$ . Then, for any  $\mathbf{u}, \mathbf{v} \in \mathbb{C}^n$ ,  $\langle A\mathbf{u}, A\mathbf{v} \rangle = \langle \mathbf{u}, \mathbf{v} \rangle$ , where the inner product is the standard dot product on  $\mathbb{C}^n$ .

2. Find an orthogonal basis for  $P_2$  with respect to the inner product

$$\langle f, g \rangle = \int_0^1 f(x)\overline{g(x)} dx.$$