 Name: ____________________

1. Define each of the following terms:
   (a) orthogonal set

   (b) orthogonal matrix

   (c) orthogonal complement of a subspace

2. Let $V = \left\{ \begin{pmatrix} x \\ y \\ z \end{pmatrix} \,\middle|\, x - y + z = 0 \right\}$
   (a) Find an orthogonal basis for V (with respect to the usual inner product on $\mathbb{R}^3$).

(b) Use your answer from part (a) to define the linear transformation $\mathbb{R}^3 \xrightarrow{\text{proj}_V} V$.

(c) Describe $V^{\perp}$. [Hint: this requires no computation.]

3. Prove that if P and Q are orthogonal matrices, then so is PQ.