1. Compute $a \cdot b$, $a \cdot c$, and $b \cdot c$, when $a = (1, -1, 1, -1)$, $b = (-2, -2, 7, \pi)$, and $c = (0, 0, 1, 0)$.

2. For each of the following triples, determine $h$ such that it is orthogonal.
   (a) $(1, 0, 0), (0, 1, 1), (0, 1, h)$
   (b) $(1, 2, -2), (2, 3, 4), (0, 1, h)$
   (c) $(h, h, 0), (h, 0, h), (0, h, h)$

3. Find a $4 \times 4$ matrix all of whose entries are $\pm 1$ such that the columns are pairwise orthogonal.

4. Prove that the formula in Fact 8.8 for the orthogonal projection of one vector onto another is correct.

Due: 8am. Wednesday December 4