1. Answer the following questions "true" or "false."

   (a) The set $R = \{f \in C[-1,1] \mid f(0) = 1\}$ is a subspace of $C[-1,1]$.
   False. The set R does not contain the zero function.

   (b) The vectors $(2,-1,3)$ and $(2,-1,-3)$ are linearly independent in $\mathbb{R}^3$.
   True. The only way for two vectors to be linearly dependent is for one to be a scalar multiple of the other, which is not the case here.

   (c) The set $S = \text{Span}\{(2,-1,3),(2,-1,-3)\}$ is a subspace of $\mathbb{R}^3$.
   True. The span of any set of vectors is always a subspace.

2. Let $\mathbf{v}_1 = (1,1,-1)$ and $\mathbf{v}_2 = (-1,-3,2)$. Use Gram-Schmidt to find vectors $\mathbf{p}_1$ and $\mathbf{p}_2$ such that $\text{Span}\{\mathbf{v}_1,\mathbf{v}_2\} = \text{Span}\{\mathbf{p}_1,\mathbf{p}_2\}$ and $\mathbf{p}_1 \cdot \mathbf{p}_2 = 0$.

   First, we let $\mathbf{p}_1 = \mathbf{v}_1 = (1,1,-1)$. Then we let

$$\begin{aligned}
\mathbf{p}_2 &= \mathbf{v}_2 - \frac{\mathbf{v}_2 \cdot \mathbf{p}_1}{\mathbf{p}_1 \cdot \mathbf{p}_1}\mathbf{p}_1 \\
&= (-1,-3,2) - \frac{-6}{3}(1,1,-1) \\
&= (-1,-3,2) + 2(1,1,-1) \\
&= (1,-1,0).
\end{aligned}$$