1. (5 points) Apply the Gram-Schmidt process to replace the given linearly independent set \( S \) by an orthonormal set with the same span as \( S \).

\[
S = \left\{ \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} \right\}.
\]

2. (5 points) Using 1, find matrices \( Q \) and \( R \) in a \( QR \) factorization of the matrix

\[
A = \begin{bmatrix} 1 & 1 \\ -2 & -1 \\ 1 & 0 \end{bmatrix}.
\]