ST 705 Linear models and variance components
Lab practice problem set 5

February 7, 2023

1. By hand, find an orthonormal basis of vectors for the subspace spanned by the set

$$\left\{ \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \\ 1 \end{pmatrix} \right\}.$$

2. Write the Gram-Schmidt orthonormalization process as a computer program. Append your computer program with the upper triangular matrix in the QR decomposition, and verify that you can recover the matrix X formed by concatenating the columns in the previous problem.