MATH 105A and 110A Review: Gram-Schmidt process

Facts to Know:

Let $\mathcal{B}$ be the collection of k vectors in $\mathbb{R}^n$:

$$\mathcal{B} =$$

$\mathcal{B}$ is said to be **orthogonal** if

$\mathcal{B}$ is said to be **orthonormal** if

Given a basis $\mathcal{B}$ for a subspace S of $\mathbb{R}^n$, then we can use the **The Gram-Schmidt process** to find another for S that is

The **projection operator** is defined by

$$\operatorname{proj}_u x =$$

Gram-Schmidt process for two vectors: Let v_1, v_2 be a basis for a some subspace of $\mathbb{R}^n$.

1. Set $u_1 =$ Then set $w_1 =$
2. Set $u_2 =$ Then set $w_2 =$

Examples:

1. The basis

$$\mathcal{B} = \left\{ \begin{pmatrix} 1 \\ 2 \\ 2 \end{pmatrix}, \begin{pmatrix} -1 \\ 0 \\ 2 \end{pmatrix} \right\}$$

is a basis for a plane in $\mathbb{R}^3$. Find an orthonormal basis the same plane.