CS3388B, Winter 2023

Problem Set 1

Due: January 13, 2023

Exercise 1. Show that the basis vector $\hat{k}$ is orthogonal to both $\hat{i}$ and $\hat{j}$.

Exercise 2. Compute the matrix product of A and B given :

$$A = \begin{bmatrix} 1 & -4 & 8 \\ 11 & 2 & 24 \\ 12 & 4 & 1 \end{bmatrix} \quad B = \begin{bmatrix} -9 & 8 & 6 \\ 0 & 15 & 2 \\ 3 & 14 & 0 \end{bmatrix}$$

Exercise 3. Consider the vector $\vec{v} = (2,3)$ and the vector $\vec{n} = (-1,2)$. Find a vector that is in the same direction as the *reflection* of $\vec{v}$ across $\vec{n}$? You don't have to exactly find the reflection, just one in the same direction. Consider the below image.
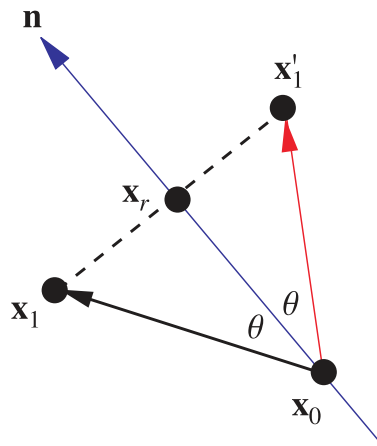
Then, find the angle between $\vec{v}$ and $\vec{n}$ and show that it is the same angle as between $\vec{n}$ and your computed reflection.

Exercise 4. Let $p = (3,2,4), q = (1,-3,4), r = (1,3,-1)$ be three points. Find the normalized normal vector to the plane containing these three points. Remember there are two such normals. Find one.