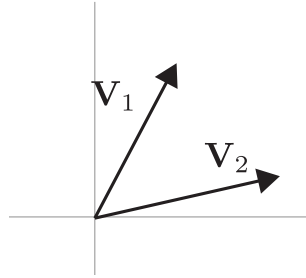


Name:

1 Math refresher



Answer the following questions about the above figure, where $\mathbf{V}_1 = (x_1, y_1, z_1)$ and $\mathbf{V}_2 = (x_2, y_2, z_2)$.

1. Find a vector \mathbf{V} that has the same direction as \mathbf{V}_1 and unit length.
2. How would you calculate the angle between vectors \mathbf{V}_1 and \mathbf{V}_2 ?
3. How would you find a vector \mathbf{V}_3 that is orthogonal to both \mathbf{V}_1 and \mathbf{V}_2 ?
4. Calculate the product $C = AB$, where

$$A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 2 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}.$$

5. Calculate $D = BA^T$, where A and B are as in Problem 4.
6. What is the directional derivative of $f(x, y, z) = yx^2 + z^3$ along the direction $(1, 2, -1)$?

2 First OpenGL program

Create an OpenGL program and write your first initial in the window using polygons, e.g., as shown in the figure below. There are many online tutorials that can use to help you set up your first program such as those at http://nehe.gamedev.net/tutorial/lessons_01__05/22004.

The course textbook also has code you can follow. Submit a printout of your image and your code at the start of the next class.

