Series 1

1) Solve the following operations on the two given vectors $\mathbf{a} = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} -0.5 \\ 1.5 \\ 0.5 \end{bmatrix}$:

$\mathbf{a} + \mathbf{b}$ $\mathbf{a} - \mathbf{b}$ $\mathbf{a} \cdot \mathbf{b}$ $\mathbf{a} \times \mathbf{b}$ $|\mathbf{a}|$ $\hat{\mathbf{b}}$

2) Implement a C++ class for modeling 3D vectors. The class must satisfy the following requirements:

a) Define the vector components as *float*: how many bytes are allocated by each instance of the class?
b) Allow developers to create new vectors from integer (*int*) values.
c) Implement vector addition and subtraction through operator overloading.
d) Implement normalization.
e) Implement dot and cross product.

Validate your class by repeating the operations of exercise 1) using your code.

Make sure that your code compiles and runs both under Windows and Linux.

Suggestion: To familiarize with the graphics engine development, put the class in a shared library and use it in a console application.