Dawson College: **Linear Algebra** (SCIENCE): 201-NYC-05-S1: Winter 2024: **Quiz 12** name: _____

Books, watches, notes or cell phones are **not** allowed. The **only** calculators allowed are the Sharp EL-531**. You **must** show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. Given $\mathbf{a}$ is a unit vector, the angle between $\mathbf{a}$ and $\mathbf{b}$ is $\frac{\pi}{6}$, and $||\mathbf{a} \times \mathbf{b}|| = 2$.

a. *(3 marks)* Find the volume of the parallelepiped defined by $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{a} \times \mathbf{b}$.

b. *(3 marks)* Find the surface area of the parallelepiped defined by $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{a} \times \mathbf{b}$.

Question 2. *(3 marks)* Simplify: $(\mathbf{u} + \mathbf{v}) \times (\mathbf{u} - \mathbf{v})$

Bonus Question *(3 marks)* Find the volume of the parallelepiped defined $\mathbf{a} = (1,\ 2,\ 3,\ 4)$, $\mathbf{b} = (1,\ 0,\ 1,\ 0)$ and $\mathbf{c} = (0,\ 1,\ 0,\ 1)$.