Dawson College: **Linear Algebra** (SCIENCE): 201-NYC-05-S8: Winter 2024: **Quiz 9** 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. *(4 marks)* Let $\mathbf{u}$ be a unit vector, and let $\mathbf{v}$ be a vector such that $||\mathbf{v}|| = \sqrt{6}$, and $\mathbf{u} \cdot \mathbf{v} = -\frac{1}{2}$. Find $||2\mathbf{u} - 3\mathbf{v}||$.

Question 2.*(3 marks each)* Determine whether the following statement is true or false. If the statement is false provide a counterexample. If the statement is true provide a proof of the statement.

a. If $\mathbf{u} \cdot \mathbf{v} = 0$, then either $\mathbf{u} = \mathbf{0}$ or $\mathbf{v} = \mathbf{0}$.

b. If $\mathbf{a}$ and $\mathbf{u}$ are nonzero vectors, then $\text{proj}_{\mathbf{a}}(\text{proj}_{\mathbf{a}}(\mathbf{u})) = \text{proj}_{\mathbf{a}}(\mathbf{u})$.