Dawson College: **Linear Algebra** (COMPUTER SCIENCE): 201-NYC-05-S9: Fall 2022: **Quiz 10** 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 the lines $\mathbf{x} = (1,0,1) + t(1,1,-1)$, $t \in \mathbb{R}$ and $\mathbf{x} = (2,3,4) + t(0,-1,2)$, $t \in \mathbb{R}$..

a. *(2 marks)* Determine whether the lines are perpendicular to each other, parallel or neither. Justify.

b. *(3 marks)* Find the point of intersection between the lines if it exists.

Questions 2. Given the planes $2x - y - z = 5$ and $-4x + 2y + 2z = 12$.

a. *(1 mark)* Determine whether the two planes are perpendicular to each other, parallel or neither. Justify.

b. *(5 marks)* Using projection(s) find the shortest distance between the two planes.

Questions 3. Given the plane $x+y+z=0$ and the line $(x,y,z)=(1+t,2+2t,3+3t)$ where $t \in \mathbb{R}$.

a. *(2 marks)* Determine whether the line is perpendicular to the plane, parallel or neither. Justify.

b. *(3 marks)* Find the point of intersection between the line and the plane if it exists.

Question Bonus. *(2 marks)* A former Prime Minister of Canada defined a proof as

> I don't know — a proof is a proof. What kind of a proof? It's a proof. A proof is a proof, and when you have a good proof, it's because it's proven.

In your own words correctly define proof.