Question 1. 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.

Questions 2. Given the planes $2x-3z=7$ and $y+2z=4$.

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

b. *(3 marks)* Find the intersection between the planes if it exists.

Questions 3. *(4 marks)* Using projection(s) find the shortest distance between $P(3,1,-2)$ and $x+2y-2z=4$.

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.