Name: _____

Pid: _____

Show all of your work. Full credit will be given only for answers with explanations.

1. (100 points) Check all the correct statements.

   ○ $u \cdot v = -7$, where $u = \langle 1, 2, 7 \rangle$ and $v = \langle 4, -2, -1 \rangle$.

   ○ Length of the projection of the vector $\langle 2, 2, 7 \rangle$ on the line going throw the vector $\langle 3, 6, 2 \rangle$ is equal to $\frac{32}{49}$

   ○ The angle between the vector $\langle 1, 1, 1 \rangle$ and $\langle 1, 1, 0 \rangle$ is equal to $\arccos \frac{2}{\sqrt{6}}$.

   ○ $u \times v = w$, where $u = \langle 1, 1, 0 \rangle$, $v = \langle 1, 2, 0 \rangle$ and $w = \langle 1, -1, 0 \rangle$.

   ○ The vector $\langle 1, 3, 5 \rangle$ is the direction of the line defined by the equation

   $$\frac{x - 1}{2} = \frac{y - 3}{3} = \frac{z - 5}{4}.$$

2. Let $A = \langle 2, 0, 0 \rangle$, $B = \langle 0, 4, 0 \rangle$.

   (a) (10 points) Find a direction vector of the line that goes through the points A and B.

   (b) (10 points) Find a parametric form of the line that goes through the points A and B.

   (c) (10 points) Find an equation of the line that goes through the points A and B.

3. (10 points) Find $u \times v$, where $u = \langle 1, 1, 0 \rangle$, $v = \langle 1, 0, 1 \rangle$

4. Let $A = \langle 1, -1, 2 \rangle$, $B = \langle -1, 0, 1 \rangle$, and $C = \langle 0, 2, 1 \rangle$.

   (a) (10 points) Find a vector n which is perpendicular to the plane that goes through the points A, B, and C.

   (b) (10 points) Find the equation of the plane passing through the points A, B, and C.