

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 through 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 .