1. (1 pt)
Find the cross product $\mathbf{a} \times \mathbf{b}$ where $\mathbf{a} = \langle 4, 4, -3 \rangle$ and $\mathbf{b} = \langle -5, 4, 3 \rangle$.
$\mathbf{a} \times \mathbf{b} = \langle$____,____,____$\rangle$
Find the cross product $\mathbf{c} \times \mathbf{d}$ where $\mathbf{c} = -1\mathbf{i} - 1\mathbf{j} + 2\mathbf{k}$ and $\mathbf{d} = 0\mathbf{i} - 2\mathbf{j} - 2\mathbf{k}$.
$\mathbf{c} \times \mathbf{d} =$ ____ **i**+____**j**+____**k**

2. (1 pt)
Find two unit vectors orthogonal to $\mathbf{a} = \langle -5, -4, 1 \rangle$ and $\mathbf{b} = \langle 0, 0, 5 \rangle$
Enter your answer so that the first vector has a positive first coordinate
First Vector: $\langle$________, ________, ________$\rangle$
Second Vector: $\langle$________, ________, ________$\rangle$

3. (1 pt)
Find the area of the parallelogram with vertices:
P(0,0,0), Q(1,0,1), R(1,1,2), S(2,1,3).
____

4. (1 pt)
Find the volume of the parallelepiped with adjacent edges PQ, PR, PS where
P(-2, -5, 5), Q(0, -2, 8), R(-3, -6, 4), S(4, -7, 7).
____

5. (1 pt)
A wrench 0.6 meters long lies along the positive y-axis, and grips a bolt at the origin. A force is applied in the direction of $\langle 0, 4, 4 \rangle$ at the end of the wrench. Find the magnitude of the force in newtons needed to supply 100 J of torque to the bolt.
____

6. (1 pt) You are looking down at a map. A vector **u** with $|\mathbf{u}| = 3$ points north and a vector **v** with $|\mathbf{v}| = 4$ points northeast. The crossproduct $\mathbf{u} \times \mathbf{v}$ points:
A) south
B) northwest
C) up
D) down
Please enter the letter of the correct answer: ___
The magnitude $|\mathbf{u} \times \mathbf{v}| =$ __________

7. (1 pt) Find a vector $\overline{v}$ that is perpendicular to the plane through the points

$$A = (-3, 2, -3),\ B = (2, 1, 5), \text{ and } C = (-5, -5, 0).$$

$\overline{v} =$ ________________.

8. (1 pt) Let P be the plane in space that intersects the x-axis at 2, the y-axis at 1, and the z-axis at 1. Find a vector $\overline{v}$ that is perpendicular to P.
$\overline{v} =$ ________________.