Analysis H – Hahn / Hlasek / Tantod _____ is crossing all t's and dotting all i's

Vectors and Parametrics: Unit 4, Quiz 2 _____ Period: _____

NO CALCULATOR 40 points

For this whole quiz: Simplify all your answers completely, but you don't need to rationalize denominators.

1. Given points P(4, 2, 7), Q(3, 1, 8), and R(5, -1, 11), and plane W that contains the points P, Q, and R. [2 pts each]

a) $\overrightarrow{PQ}$ = _____

b) $\overrightarrow{PR}$ = _____

c) $\overrightarrow{PQ} \cdot \overrightarrow{PR} =$

d) $proj_{\overrightarrow{PR}} \overrightarrow{PQ} =$

e) $\overrightarrow{PQ} \times \overrightarrow{PR} =$

f) Write a vector equation of plane W.

g) Find a unit vector that is normal to plane W.

h) Find the area of the triangle that has P, Q, and R as its vertices.

2. The dot product of two (non-zero) vectors is negative. What does that mean about the angle between the vectors? [2 pt]

3. The cross product of two (non-zero) vectors is 0. What does that mean about the angle between the two vectors? [2 pt]

4. Vector $\vec{n} = \langle -2,8,5 \rangle$ is normal to plane P, and the point A(1, -3, 6) is in the plane. Give the equation of the plane in standard form (Ax + By + Cz = D). [3 pts]

5. The vector equation of plane R is given as $\langle x, y, z \rangle = \langle 8, -5,2 \rangle + s\langle 0,1,3 \rangle + t\langle -1,0,4 \rangle$.

   a) Write the equation of the plane in standard form (Ax + By + Cz = D). [3 pts]

   b) Find the distance from plane R to the point (10, 11, 12). [2 pts]

6. Consider the points A(x, 11, -1), B(8, 10, -8), and C(12, 2, 1). A and B are in Plane P, and vector $\overrightarrow{AC}$ is normal to the plane. Find all possible values for x. [4 pts]

7. Given: $\vec{u} \cdot \vec{v} = 0$, $|\vec{u}| = 12$, and $|\vec{u} \times \vec{v}| = 6$. $|\vec{v}| =$_____ [1 pt]

8. $\langle 4, y, z \rangle \times \langle 9,1,3 \rangle = \langle -13,51,22 \rangle$. Solve for *y* and *z*. Show all your work to receive credit. [4 pts]

9. Plane P is determined by the equation $-3x + 4y + 5z = 21$. Find the rectangular equations of both planes that are parallel to Plane P and $\sqrt{2}$ units away from Plane P. [3 pts]