Math 3C (21945) HW #1

Due at the beginning of lecture on Thursday, February 5th.

In order to receive a ✓ , you must attempt all problems and write out all steps leading to your answers neatly and legibly. You cannot simply write the correct answer to demonstrate your mathematical understanding.

You must include your name, the course title and section number on the first page. All homework sets must be stapled. No late homework will be accepted without my express permission. You may receive a ✗ if these guidelines are not followed.

Good luck!

Solve the problem.

1) Find the center and radius of the sphere with the equation $2x^2 + 2y^2 + 2z^2 - x + y - z - 9 = 0$.　　1) _____

Find the following.

2) If $\mathbf{v} = \langle -7, -5, 0 \rangle$, find $\| \mathbf{v} \|$.　　2) _____

Find the angle between the given vectors to the nearest tenth of a degree.

3) $\mathbf{v} = 3\mathbf{i} + 5\mathbf{j}, \ \mathbf{w} = 3\mathbf{i} + 4\mathbf{j}$　　3) _____

4) $\mathbf{u} = \langle 3, -8 \rangle, \mathbf{v} = \langle -8, -3 \rangle$　　4) _____

Find the vector $\text{proj}_\mathbf{v} \ \mathbf{u}$.

5) $\mathbf{v} = \mathbf{i} + \mathbf{j} + \mathbf{k}, \ \mathbf{u} = 4\mathbf{i} + 12\mathbf{j} + 3\mathbf{k}$　　5) _____

Write the equation for the plane.

6) The plane through the point P(–2, –6, –6) and normal to $\mathbf{n} = 7\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$.　　6) _____

7) If $\mathbf{u} = \mathbf{i} + \mathbf{j} + \mathbf{k}, \mathbf{v} = 10\mathbf{i} + 2\mathbf{j} + 6\mathbf{k},$ and $\mathbf{w} = 4\mathbf{i} + 3\mathbf{j} + 10\mathbf{k},$ evaluate $(\mathbf{u} \times \mathbf{v}) \cdot \mathbf{w}$.　　7) _____

8) Find a unit vector perpendicular to both $7\mathbf{i} + 5\mathbf{k}$ and $3\mathbf{k}$.　　8) _____

9) Find the equation of the plane containing the points P = (3, 1, 3), Q = (3, 0, –3), and R = (0, 2, –1).　　9) _____

Find parametric equations for the line described below.

10) The line through the points P(–1, –1, 1) and Q(–3, 3, –5)　　10) _____

Identify the type of surface represented by the given equation.

11) $y^2 + z^2 = 8$　　11) _____

1) center $= \left(\dfrac{1}{4}, -\dfrac{1}{4}, \dfrac{1}{4} \right)$,; radius $= \dfrac{5\sqrt{3}}{4}$

2) $\sqrt{74}$

3) $5.9°$

4) $90°$

5) $\dfrac{19}{3}\mathbf{i} + \dfrac{19}{3}\mathbf{j} + \dfrac{19}{3}\mathbf{k}$

6) $7x + 2y + 3z = -44$

7) -52

8) $\mathbf{j}$

9) $10x + 18y - 3z - 39 = 0$

10) $x = -2t - 1,\ y = 4t - 1,\ z = -6t + 1$

11) Cylinder