Name: MATH 241 §004

Quiz 1: §12.1-12.4

Complete the following problems to the best of your ability. **SHOW ALL OF YOUR WORK.** Unshown work will not be graded. You may not use a calculator.

1. Find the center and radius of the sphere given by $x^2 - 4x + y^2 + 2y + z^2 = -4$.

2. Let $\mathbf{u} = \langle 2, 1, -1 \rangle$ and $\mathbf{v} = \langle 0, -3, 2 \rangle$. Calculate the following.

   (a) The dot product $\mathbf{u} \cdot \mathbf{v}$.

   (b) The smallest angle between $\mathbf{u}$ and $\mathbf{v}$ (you may leave your answer in terms of inverse trig functions).

   (c) The projection $\text{proj}_{\mathbf{v}} \mathbf{u}$.

   (d) The cross product $\mathbf{u} \times \mathbf{v}$.