- 1. In each part find the equation of the sphere with center (2, -1, -3) and satisfying the given conditions.
 - (a) (2 points) Tangent to the *xy*-plane
 - (b) (2 points) Tangent to the x-axis
 - (c) (2 points) Passes through the origin
- 2. A parallelogram has $\mathbf{i}-\mathbf{j}+\mathbf{k},\mathbf{i}-3\mathbf{j}+2\mathbf{k}$ as adjacent sides. Find
 - (a) (2 points) Its area.
 - (b) (2 points) The lengths of its heights.
 - (c) (2 points) The lengths of its diagonals.
- 3. Given the points P(-3, 1, 2), A(1.1.0), B(-2, 3, -4) find
 - (a) (2 points) $\operatorname{Proj}_{\overrightarrow{AB}}\overrightarrow{AP}$
 - (b) (2 points) The component of \overrightarrow{AP} orthogonal to \overrightarrow{AB}
 - (c) (2 points) The distance from the point P to the line through A, B.
- 4. Consider the parallelepipped with adjacent edges $\mathbf{u} = \langle 2, 2, 1 \rangle$, $\mathbf{v} = \langle 1, 1, 2 \rangle$, $\mathbf{w} = \langle 1, 3, 3 \rangle$.
 - (a) (2 points) Find the volume
 - (b) (2 points) Find the area of the face determined by **u** and **w**.
 - (c) (2 points) Find the angle between **v** and the face determined by **u** and **w**.
- 5. (4 points) Find parametric equations of the line through the point (5, 0, -2) that is parallel to the planes x 4y + 2z = 0 and 2x + 3y z + 1 = 0.
- 6. (2 points) Find the equation of the plane through the origin that is parallel to the plane 4x 2y + 7z + 12 = 0.