Quiz 1 25 points Math 200 Name: ____________________

1. (4 points) Find the equation of the plane in standard form that contains the points $P = \left(\sqrt{2}, \frac{\pi}{4}, 1\right)_C$, $Q = (3, 2, 2)$, $R = (1, 2, 3)$. Hint: Convert the cylindrical point to rectangular coordinates.

2. Let $\vec{v} = -2\hat{\imath} + 2\hat{\jmath} + \hat{k}$ and $\vec{w} =< 3, 0, 4 >$. You may use work from one part in other parts.

   (a) (2 points) Find the cosine of the angle between $\vec{v}$ and $\vec{w}$.

   (b) (4 points) Find $\vec{v}_{\parallel \vec{w}}$ and $\vec{v}_{\perp \vec{w}}$.

   (c) (2 points) Find the work done by a force $\vec{v}$ applied to a particle with displacement $\vec{w}$.

3. (1 point) Sketch $y^2 + z^2 = 4$ with positively oriented xyz-axes.

4. Let $\vec{u} = 2\hat{\imath} + 2\hat{\jmath} + \hat{k}$ and $\vec{p} =< 2, -2, 1 >$. You may use work from one part in other parts.

   (a) (4 points) Find the area of the triangle spanned by $\vec{p}$ and $\vec{u}$

   (b) (2 points) Find the flux of the vector field $\vec{F} =< 1, -3, 2 >$ through the parallelogram spanned by $\vec{u}$ and $\vec{p}$ and oriented from $\vec{u}$ to $\vec{p}$.

   (c) (1 point) Find the volume of the box spanned by $\vec{F}$, $\vec{p}$, and $\vec{u}$.

5. (3 points) Find a position function and the coordinate equations for the line that contains the point $P = (2, 1, 1)$, and is perpendicular to the plane $x + 2y + 3z = 4$.

6. (2 points) Convert $Q = (2, 0, \pi/3)_S$ to cylindrical and rectangular coordinates.