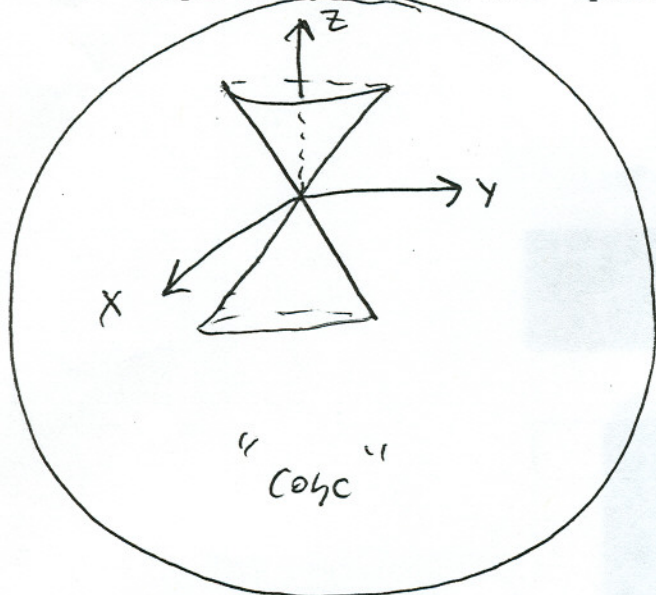3. Graph $x^2 + y^2 - z^2 = 0$ in 3-space.

"Cone"

4. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equation of the plane through $(0,1,1)$, $(1,3,-2)$, and $R = (3,1,4)$.

$P =$ $Q =$

The plane is $\perp$ $\vec{PQ} \times \vec{PR} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 2 & -3 \\ 3 & 0 & 3 \end{vmatrix} = 6\vec{i} - 12\vec{j} - 6\vec{k}$

The plane is $6(x-0) - 12(y-1) - 6(z-1) = 0$

$x - 2(y-1) - (z-1) = 0$

$\boxed{x - 2y - z = -3}$

Verify

$0 - 2 - 1 = -3$ ✓

$1 - 6 + 2 = -3$ ✓

$3 - 2 - 4 = -3$ ✓