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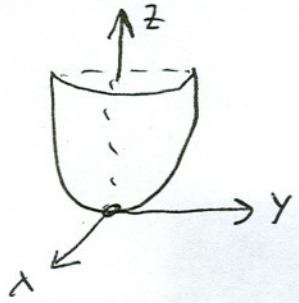
3. Graph and name $x^2 + y^2 = z$ in $3-$ space.



Paraboloid

4. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equation of the plane through $(1,2,2)$, $(1,4,5)$, and $(5,5,4)$.

P= Q= R=

$$\overrightarrow{PQ} \times \overrightarrow{PR} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 0 & 2 & 3 \\ 4 & 3 & 2 \end{vmatrix} = \vec{i}(-5) + 12\vec{j} - 8\vec{k}$$

$-5(x-1) + 12(y-2) - 8(z-2) = 0$

$-5x + 12y - 8z + 5 - 24 + 16 = 0$

$\boxed{-5x + 12y - 8z = 3}$

check at P $-5 + 24 - 16 = 3$ ✓

at Q $-5 + 48 - 40 = 3$ ✓

at R $-25 + 60 - 32 = 3$ ✓