MATH 11 WORKSHEET: 3d & spheres

9/22/10
Barnett

A) Write the formula for the distance from $P=(h,k,l)$ of the point $Q=(x,y,z)$:

dist = ...

Thus write the Cartesian equation for a sphere radius r and center (h,k,l):

B) Describe the object given the equation, or vise versa:

i) $(x+1)^2 + y^2 + z^2 = 1$

ii) plane passing through $(-1,-2,-3)$ parallel to yz-plane

iii) $0 \leq y \leq 2$

iv) $y^2 + z^2 = 4$

C) Find (x,y,z) coords of the vector of length 1 lying in xy plane, 60° from the x-axis (ℓ with $y>0$):

This vector is now rotated 45° up towards z-axis; find (x,y,z):

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~ SOLUTIONS ~

A) Write the formula for the distance from $P=(h,k,l)$ of the point $Q=(x,y,z)$:

dist = ... $\sqrt{(x-h)^2+(y-k)^2+(z-l)^2}$

Thus write the Cartesian equation for a sphere radius r and center (h,k,l):
means all pts in $\mathbb{R}^3$ with dist r from (h,k,l)

$dist^2 = r^2$ is $(x-h)^2+(y-k)^2+(z-l)^2 = r^2$

B) Describe the object given the equation, or vise versa:

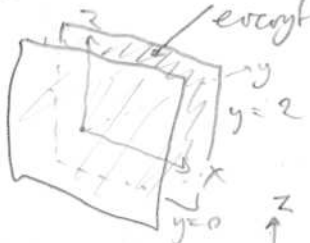
i) $(x+1)^2+y^2+z^2 = 1$ sphere radius 1, center $(-1,0,0)$ ← note sign.

ii) plane passing through $(-1,-2,-3)$ parallel to yz-plane

the plane $x=-1$.

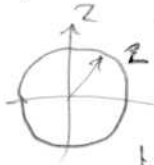
iii) $0 \le y \le 2$

the 'slab'



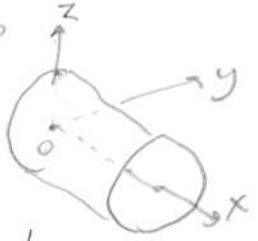
everything in here

iv) $y^2+z^2 = 4$ ← note: x = anything!



but not a circle.

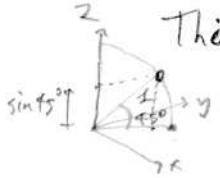
⇒ circle extruded along x: cylinder.



C) Find (x,y,z) coords of the vector of length 1 lying in xy plane, 60° from the x-axis (& with $y>0$):

$(\frac{1}{2}, \frac{\sqrt{3}}{2}, 0)$

This vector is now rotated 45° up towards z-axis; find (x,y,z):



x & y are reduced by factor $\cos 45 = \frac{1}{\sqrt{2}}$ ⇒ $\left(\frac{1}{2\sqrt{2}}, \frac{1}{2}\sqrt{\frac{3}{2}}, \frac{1}{\sqrt{2}}\right)$.