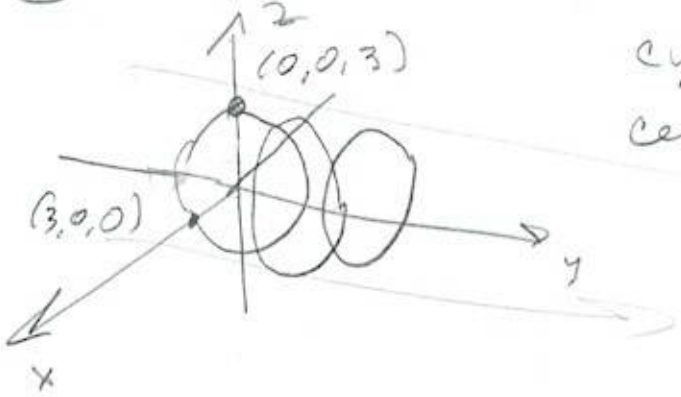
203 §12.1 #s 3, 8, 10, 11, 16, 20, 31, 37

(3) Which of $A(-4,0,-1)$, $B(3,1,-5)$, $C(2,4,6)$ is closest to yz-plane?

yz-plane: $x=0$ | C is closest

xz-plane? xz-plane: $y=0$ | A is in xz-plane.

(8) Sketch & describe $x^2+z^2=9$



cylinder, radius 3, center axis is y-axis.

(10) Find lengths of sides of ΔPQR Rt triangle? Isosceles?

$P(2,-1,0)$, $Q(4,1,1)$, $R(4,-5,4)$

$\|\overrightarrow{PQ}\| = \sqrt{(2-4)^2+(-1-1)^2+(0-1)^2}$

$= \sqrt{2^2+2^2+1^2} = \sqrt{9} = 3$

$\|\overrightarrow{PR}\| = \sqrt{(2-4)^2+(-1+5)^2+4^2} = \sqrt{2^2+4^2+4^2}$

$= \sqrt{36} = 6$

$\|\overrightarrow{QR}\| = \sqrt{(4-4)^2+(1+5)^2+(1-4)^2} = \sqrt{36+9}$

$= \sqrt{45} = 3\sqrt{5}$

Now, $\|\overrightarrow{PR}\|^2 + \|\overrightarrow{PQ}\|^2 = 3^2+6^2 = 45 = \|\overrightarrow{QR}\|^2$

So ΔPQR is right triangle, not isosc.

203 §12.1 #s 11, 16, 20, 31, 37

(11) Determine if pts lie on a straight line.

(a) $A(2,4,2)$, $B(3,7,-2)$, $C(1,3,3)$

$\|\vec{AB}\| = \sqrt{(2-3)^2 + (4-7)^2 + (2+2)^2}$

$= \sqrt{1^2 + 3^2 + 4^2} = \sqrt{26}$

$\|\vec{AC}\| = \sqrt{(2-1)^2 + (4-3)^2 + (2-3)^2}$

$= \sqrt{1^2 + 1^2 + 1^2} = \sqrt{3}$

$\|\vec{BC}\| = \sqrt{(3-1)^2 + (7-3)^2 + (-2-3)^2}$

$= \sqrt{2^2 + 4^2 + 5^2} = \sqrt{4+16+25} = \sqrt{45} = 3\sqrt{5}$

Not collinear — 2 short don't sum to long.

(b) $D(0,-5,5)$, $E(1,-2,4)$, $F(3,4,2)$

$\|\vec{DE}\| = \sqrt{1^2 + 3^2 + 1^2} = \sqrt{11}$

$\|\vec{DF}\| = \sqrt{3^2 + 9^2 + 3^2} = \sqrt{9+81+9} = \sqrt{99} = 3\sqrt{11}$

$\|\vec{EF}\| = \sqrt{2^2 + 6^2 + 2^2} = \sqrt{44} = 2\sqrt{11}$

$\|\vec{DF}\| = \|\vec{DE}\| + \|\vec{EF}\| \Rightarrow$ collinear.

203 S'12,1 #s 16, 20, 31, 37

(16) Eq'n of sphere thru origin w. ctr (1, 2, 3)

Radius = $D((1,2,3),(0,0,0))$

$= \sqrt{1^2+2^2+3^2} = \sqrt{1+4+9} = \sqrt{14}$

$\Rightarrow \boxed{(x-1)^2+(y-2)^2+(z-3)^2=14}$

(20) $3x^2+3y^2+3z^2 = 10+6y+12z$ is a sphere. Prove it. Give center & radius

$3x^2+3y^2-6y+3z^2-12z = 10$

$3x^2+3(y^2-2y+1^2)+3(z^2-4z+2^2) = 10+3+12$

$3(x^2+(y-1)^2+(z-2)^2 = 25$

$x^2+(y-1)^2+(z-2)^2 = \frac{25}{3}$;3

sphere of radius $\sqrt{\frac{25}{3}} = \frac{\sqrt{75}}{3}$ w/

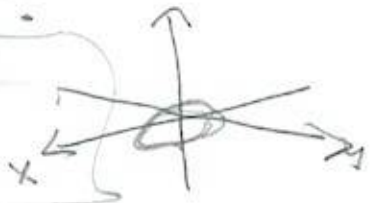
center $(x,y,z) = (0,1,2)$

§12.1 #s 31, 37

#s 25-38 Describe the

(31) $x^2+y^2=4$, $z=-1$ region in $\mathbb{R}^3$.

A CIRCLE of radius 2 in the plane $z=-1$



(37) $x^2+z^2 \leq 9$ solid

is a right circular cylinder of radius 3, with y-axis the long axis. Also, its interior (& boundary).