

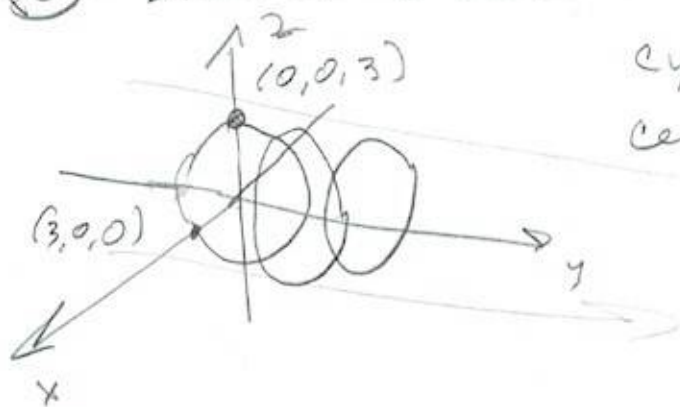
203  $\$12.1$  #s 3, 8, 10, 11, 16, 20, 31, 37

(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  $\triangle PQR$   
 $P(2, -1, 0)$ ,  $Q(4, 1, 1)$ ,  $R(4, -5, 4)$  RT triangle?  
Isosceles?

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

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

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

$$= \sqrt{36} = 6$$

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

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

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

So  $\triangle PQR$  is right triangle, not isosceles.

203 §12.1 #5 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)  $D(0, -5, 5), E(1, -2, 4), F(3, 4, 2)$

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

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

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

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

203 S(12,1) #s 16, 20, 31, 37

(16) Eqn of sphere thru origin with center (1, 2, 3)

$$\text{Radius} = D((1, 2, 3), (0, 0, 0))$$

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

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

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

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

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

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

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

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

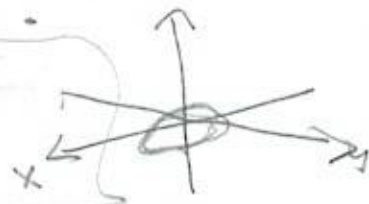
center  $(x, y, z) = (0, 1, 2)$

§ 12: #s 31, 37

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