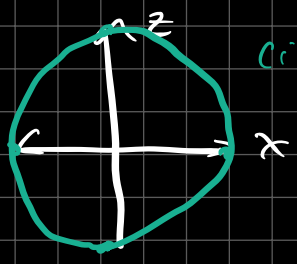
12.1

(8) $x^2 + z^2 = 9$ - describe & sketch surface.

"circle" in xz plane.

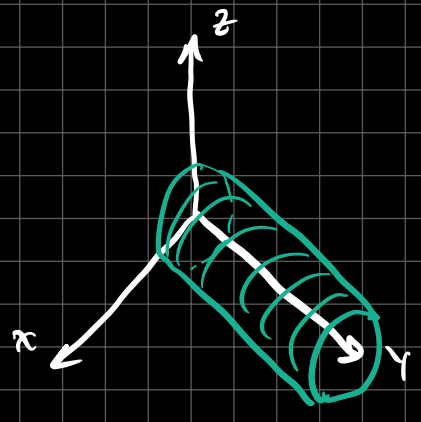
for all values of y.



circle of radius 3.

becomes cylinder in $\mathbb{R}^3$

Centered about y-axis.



(9) Given $\triangle PQR$

$P(3,-2,-3)$ $Q(7,0,1)$ $R(1,2,1)$.

(a) Is the $\triangle$ isosceles?

$D = \sqrt{(\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2}$

$|PQ|$ or $\|\vec{PQ}\|$

vectors aren't necessary here.

$|PQ| = \sqrt{(7-3)^2 + (0-(-2))^2 + (1-(-3))^2}$

$= \sqrt{16 + 4 + 16}$

$= 6$

$|PR| = \sqrt{(1-3)^2 + (2-(-2))^2 + (1-(-3))^2} = \sqrt{4 + 16 + 16} = 6.$

(b) Is it a right Δ?

find $|QR|$ and use pyth thm.

$$|QR| = \sqrt{(1-7)^2 + (2-0)^2 + (1-1)^2} = \sqrt{36+4} = \sqrt{40}$$

Check $6^2 + 6^2 \neq (\sqrt{40})^2$?

not Right Δ.

(12) find distance from $(4,-2,6)$ to

xy plane $z=0$. proj of point onto plane $(4,-2,0)$ distance $= 6$.

yz plane.

$x=0$

proj onto the plane $(0,-2,6)$

distance $= 4$.

(14) find equation of sphere with center $(2,-6,4)$ and radius $= 5$

$$(x-2)^2 + (y+6)^2 + (z-4)^2 = 25$$

what is the intersection of sphere w/ xy plane? ($z=0$)

$$(x-2)^2 + (y+6)^2 + \underbrace{(0-4)^2}_{16} = 25$$

$(x-2)^2 + (y+6)^2 = 9$ $\rightsquigarrow$ circle of radius 3.

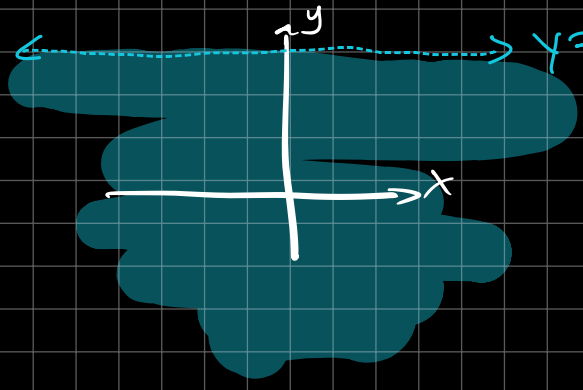
Intersection w/ xz plane.

$y=0$

$$(x-2)^2 + \underbrace{(0+6)}_{36}{}^2 + (z-4)^2 = 25$$

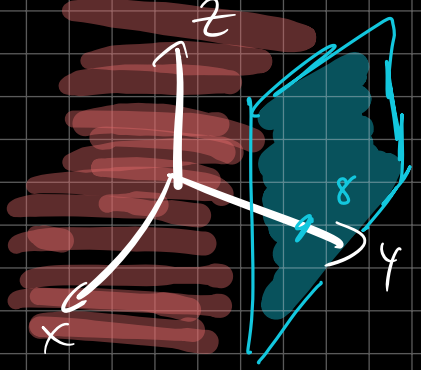
$$(x-2)^2 + (z-4)^2 = -9 \Rightarrow \text{no intersection.}$$

(27) Describe in words $y < 8$ in $\mathbb{R}^2$, $\mathbb{R}^3$



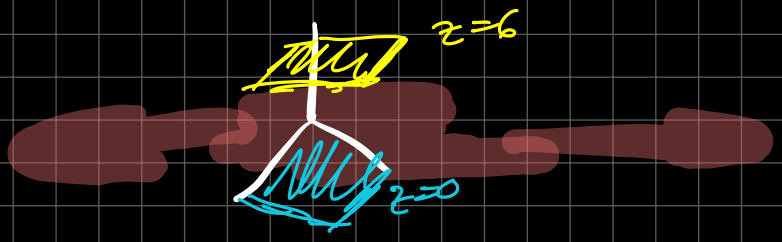
3 space with all y values less than 8

all points in $\mathbb{R}^3$ behind plane $y=8$



(29) Same as above but now $0 \le z \le 6$

all points on or between $z=0, z=6$



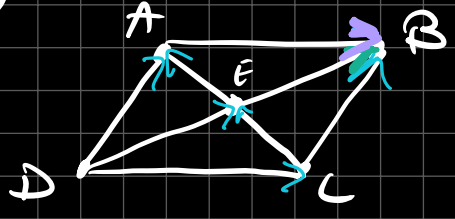
(35) $1 \le x^2+y^2+z^2 \le 5$

volume blw Sphere $x^2+y^2+z^2=1$

$x^2+y^2+z^2=5$

12.2

(3)



What are the equal vectors?

$\vec{DE}, \vec{EB}$

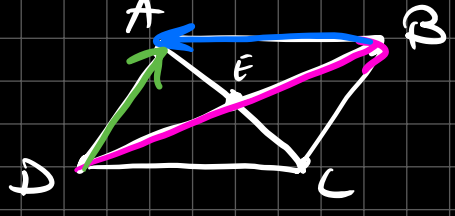
$\vec{DA}, \vec{CB}$

$\vec{AB}, \vec{BC}$

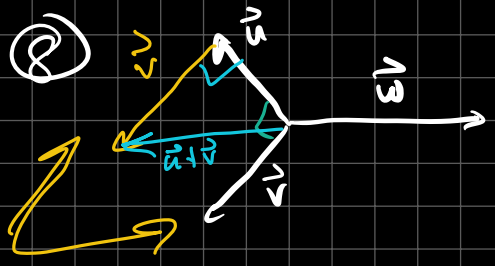
$\vec{CE}, \vec{AE}$

what is $\vec{DA} + \vec{AB} = \vec{DB}$

$\vec{DB} - \vec{AB} = -\vec{DB} + \vec{BA} = \vec{DA}$



(8)

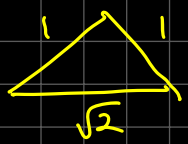


$\|\vec{u}\| = \|\vec{v}\| = 1$

and $\vec{u}+\vec{v}+\vec{w} = \vec{0}$

$-\vec{w}$ $\quad -\vec{w}$

what is $\|\vec{w}\|$?



$\vec{u}+\vec{v} = -\vec{w}$ $\qquad \|-\vec{w}\| = \|\vec{w}\|$

$\|-\vec{w}\| = \sqrt{2} \Rightarrow \|\vec{w}\| = \sqrt{2}$