Lista 6 - Geometria Analítica

1- a) $\vec{v} = (1, 1, 1)$ $|\vec{v}| = \sqrt{1^2 + 1^2 + 1^2} \to = \sqrt{3}$

b) $\vec{v} = (3, 0, 4)$ $|\vec{v}| = \sqrt{3^2 + 0^2 + 4^2} \to \sqrt{25} = 5$

c) $\vec{v} = (-1, 1, 0)$ $|\vec{v}| = \sqrt{1^2 + 1^2 + 0^2} \to \sqrt{2}$

d) $\vec{v} = (4, 3, -1)$ $|\vec{v}| = \sqrt{4^2 + 3^2 - 1^2} \to \sqrt{26}$

2- a) $(\vec{e_1}, \vec{e_2}, \vec{e_3})$ são vetores unitário e ortogonais, ou, seja, dos são perpendiculares dois a dois.

b) $\vec{u} = \overrightarrow{CD} + \overrightarrow{CB} + \overrightarrow{EF} + \overrightarrow{EH}$

$\vec{v} = \overrightarrow{DC} + \overrightarrow{CB} + \overrightarrow{HE} + \overrightarrow{EF}$

$\vec{w} = \overrightarrow{GC} + \overrightarrow{EA}$

3- a) $\vec{AB} = \vec{B} - \vec{A} = (5-2, 1-4, -3-3) = (3, -3, -6)$
$\vec{BC} = \vec{C} - \vec{B} = (0-5, -3-1, 1-(-3)) = (-5, -4, 4)$
$\vec{CA} = \vec{A} - \vec{C} = (2-0, 4-(-3), 3-1) = (2, 7, 2)$

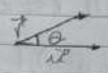
b) ~~[illegible]~~ $\|\vec{AB}\| \sqrt{3^2+(-3)^2+(-6)^2} = \sqrt{54}$
$\|\vec{BC}\| \sqrt{(-5)^2+(-4)^2+4^2} = \sqrt{57}$
$\|\vec{CA}\| \sqrt{2^2+7^2+2^2} = \sqrt{56}$
O triângulo não é isósceles pois temos 3 lados diferentes

c) ponto médio de AB $= \left(\frac{2+5}{2}, \frac{4+1}{2}, \frac{3+(-3)}{2}\right) = \left(\frac{7}{2}, \frac{5}{2}, 0\right)$
ponto médio de BC $= \left(\frac{5+0}{2}, \frac{1+(-3)}{2}, \frac{-3+1}{2}\right) = \left(\frac{5}{2}, -1, -1\right)$

ponto médio de $\vec{CA} = \left(\frac{0+2}{2}, \frac{(-3)+4}{2}, \frac{1+3}{2}\right) = \left(1, \frac{1}{2}, 2\right)$

d) A soma dos vetores de um triângulo fechado resulta um vetor nulo

E. 4 - a) $|\vec{u} \cdot \vec{v}| \leq \|\vec{u}\| \|\vec{v}\|$



$\vec{u} \cdot \vec{v} = \|\vec{u}\| \|\vec{v}\| \cos\theta$
$|\vec{u} \cdot \vec{v}| = |\|\vec{u}\| \|\vec{v}\| \cos\theta|$
$\|\vec{u}\| \|\vec{v}\| |\cos\theta|$
$\leq \|\vec{u}\| \|\vec{v}\| \cdot 1$

$$\begin{cases} -1 \leq \cos\theta \leq 1 \\ 0 \leq |\cos\theta| \leq 1 \end{cases}$$

b) $\|\vec{u} + \vec{v}\| \leq \|\vec{u}\| + \|\vec{v}\|$
$\|\vec{u} + \vec{v}\|^2 = \|\vec{u}\|^2 + 2\vec{u} \cdot \vec{v} + \|\vec{v}\|^2$
$\leq \|\vec{u}\| + 2\|\vec{u}\| \|\vec{v}\| + \|\vec{v}\|^2$
$= (\|\vec{u}\| + \|\vec{v}\|)^2$

c) $\|\vec{u} + \vec{v}\|^2 - \|\vec{u} - \vec{v}\|^2 = \|\vec{u} + \vec{v}\| \cdot \|\vec{u} + \vec{v}\| - \|\vec{u} - \vec{v}\| \cdot \|\vec{u} - \vec{v}\|$
$(\vec{u} \cdot \vec{u} + \vec{u} \cdot \vec{v} + \vec{v} \cdot \vec{u} + \vec{v} \cdot \vec{v}) - (\vec{u} \cdot \vec{u} - \vec{u} \cdot \vec{v} - \vec{v} \cdot \vec{u} + \vec{v} \cdot \vec{v})$
$\vec{u} \cdot \vec{v} + \vec{u} \cdot \vec{v} + \vec{u} \cdot \vec{v} + \vec{u} \cdot \vec{v} = 4\,\vec{u} \cdot \vec{v}$

5. a) $\vec{u} = (1,0,1)$, $\vec{v} = (-2,10,2)$

$\vec{u}.\vec{v} = (1,0,1).(-2,10,2) = (1.(-2)+0.10+1.2) =$

$= (-2+0+2) = (0)$ 0^0 radianos

b) $\vec{u} = (-1,1,1)$, $\vec{v} = (1,1,1)$

$\vec{u}.\vec{v} = (-1,1,1).(1,1,1) = (-1.1+1.1+1.1) =$

$= (-1+1+1) = (1)$

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

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

$1 = \sqrt{3}.\sqrt{3}.\cos\theta$

$\frac{1}{3} = \cos\theta$

c) $\vec{u} = (3,3,0)$, $\vec{v} = (2,1,-2)$

$\vec{u}.\vec{v} = (3.2+3.1+0.(-2)) = (9)$

$|\vec{u}| = \sqrt{3^2+3^2+0^2} = \sqrt{18}$

$|\vec{v}| = \sqrt{2^2+1^2+(-2)^2} = \sqrt{9} = 3$

$9 = \sqrt{18}.3.\cos\theta$

$\frac{9}{3\sqrt{18}} = \cos\theta \Rightarrow \frac{3}{\sqrt{18}} = \cos\theta \Rightarrow \frac{3}{2\sqrt{3}} = \cos\theta \Rightarrow \frac{3\sqrt{3}}{2\sqrt{3}.\sqrt{3}} = \cos\theta \Rightarrow$

$\Rightarrow \frac{\cancel{3}\sqrt{3}}{2.\cancel{3}} = \cos\theta \Rightarrow \frac{\sqrt{3}}{2} = \cos\theta$ $\quad \cos 30° = \frac{\sqrt{3}}{2}$ $\quad$ em radianos $= \frac{\pi}{6}$

d) $\vec{u} = (\sqrt{3}, 1, 0)$ $\quad \vec{v} = (\sqrt{3}, 1, 2\sqrt{3})$

$\vec{u}.\vec{v} = (\sqrt{3}.\sqrt{3}+1.1+0.2\sqrt{3}) = (3+1+0) = (4)$

$|\vec{u}| = \sqrt{(\sqrt{3})^2+1^2+0^2} = \sqrt{3+1} = \sqrt{4} = 2$

$|\vec{v}| = \sqrt{(\sqrt{3})^2+1^2+(2\sqrt{3})^2} = \sqrt{3+1+12} = \sqrt{16} = 4$

$4 = 2.4.\cos\theta \Rightarrow \frac{4}{8} = \cos\theta = \frac{1}{2} = \cos\theta \quad \theta = 60°$

em radianos $= \frac{\pi}{3}$

6. a) $\vec{u}.\vec{v} = 0$

$\vec{u}.\vec{v} = (x+1, 1, 2).(x-1, -1, -2) \Rightarrow \vec{u}.\vec{v} = ((x+1).(x-1)+(-1)+(-4)) \Rightarrow$

$\Rightarrow x^2-1+(-1)+(-4) = 0 \quad x^2-6=0 \Rightarrow x^2 = 6 = x = \sqrt{6}$

b) $\vec{u}.\vec{v} = 0$ $\quad \vec{u}.\vec{v} = (x, x, 4).(4, x, 1) = 0$

$\vec{u}.\vec{v} = (4x + x^2 + 4) = 0$

$\Rightarrow x^2+4x+4=0 \quad \Delta = 4^2 - 4.1.4$

$\Delta = 16-16 \Rightarrow 0$

$x = \frac{-4 \pm \sqrt{\Delta}}{2} \Rightarrow x = \frac{-4}{2} = x = -2$

$u_1 = x \quad u_2 = y \quad u_3 = z$

7. a)

$(1 \cdot u_1 + 1 \cdot u_2 + 1 \cdot u_3) = -1 \qquad x + y + z = -1$

$(4 \cdot u_1 + (-1) \cdot u_2 + 5 \cdot u_3) = 0 \qquad 4x - y + 5z = 0$

$(1 \cdot u_1 + (-2) \cdot u_2 + 3 \cdot u_3) = 0 \qquad x - 2y + 3z = 0$

$$\begin{vmatrix} 1 & 1 & 1 \\ 4 & -1 & 5 \\ 1 & -2 & 3 \end{vmatrix} \begin{matrix} 1 & 1 \\ 4 & -1 \\ 1 & -2 \end{matrix}$$

$-1 \quad -10 \quad +2 \quad -3 \quad 5 \quad -8$

$1 \qquad -6$

$-7 = D$

$$D_x = \begin{vmatrix} -1 & 1 & 1 \\ 0 & -1 & 5 \\ 0 & -2 & 3 \end{vmatrix} \begin{matrix} -1 & 1 \\ 0 & -1 \\ 0 & -2 \end{matrix}$$

$0 \quad 10 \quad 0 \quad 3 \quad 0 \quad 0$

$D_x = -7$

$$D_y = \begin{vmatrix} 1 & 1 & 1 \\ 4 & 0 & 5 \\ 1 & 0 & 3 \end{vmatrix} \begin{matrix} -1 & 1 \\ 0 & -1 \\ 0 & -2 \end{matrix}$$

$0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$

$$D_z = \begin{vmatrix} 1 & 1 & -1 \\ 4 & -1 & 0 \\ 1 & -2 & 0 \end{vmatrix} \begin{matrix} 1 & 1 \\ 4 & -1 \\ 1 & -2 \end{matrix}$$

$0 \quad 0 \quad 0 \quad 0 \quad 8$

7

$x = 1$

$y = 0$

$z = -1$

$\vec{u} + \vec{v} = (\vec{u} \cdot \vec{v}) + (\vec{u} \cdot \vec{v}) = \|\vec{u}\| \cdot \|\vec{v}\| \cdot \cos(\pi/4) = \sqrt{5} \cdot \cos(\pi/4)$

$\vec{u} - \vec{v} = (\vec{u} \cdot \vec{v}) - (\vec{u} \cdot \vec{v}) = \|\vec{u}, \vec{v}\| = \|\vec{u}\| \cdot \|\vec{v}\| \cos(\pi/4) = \sqrt{5} \cdot \cos(\pi/4)$

$\|\vec{u} + \vec{v}\| = \sqrt{(\sqrt{5}+1)^2} = \sqrt{6 + 2\sqrt{5}} \qquad \cos\theta = \dfrac{4}{\sqrt{6+2\sqrt{5}}\,(6-2\sqrt{5})} = \dfrac{4}{\sqrt{36-20}} = \dfrac{4}{\sqrt{16}} = 1$

$\|\vec{u} - \vec{v}\| = \sqrt{(\sqrt{5}-1)^2} = \sqrt{6 - 2\sqrt{5}}$

8. a) Projeção $\dfrac{\vec{v}}{\vec{u}} = \dfrac{(\vec{u} \cdot \vec{v})}{\|\vec{u}\|^2} \cdot \vec{u} = \vec{u} \cdot \vec{v} = (1, -1, 2) \cdot (3, -1, 1) = 3 + 1 + 2 = 6$

$\|\vec{u}\|^2 = \sqrt{3^2 + (-1)^2 + 1^2}^{\,2} = \sqrt{9+1+1}^{\,2} = \sqrt{11}^{\,2} = 11$

b) Projeção $\dfrac{\vec{v}}{\vec{u}} = \dfrac{(\vec{u} \cdot \vec{v})}{\|\vec{u}\|^2} \cdot \vec{u} = \vec{u} \cdot \vec{v} \to (1, 3, 5) \cdot (-3, 1, 0) = -3 + 3 + 0 = 0$

não existe!!

c) $\vec{u} \cdot \vec{v} = (-1, 1, 1) \cdot (2, 4, 2) = 2 + 2 + 1 = 5$

$\|\vec{u}\|^2 = \sqrt{1^2 + 1^2 + 1^2}^{\,2} = \sqrt{3}^{\,2} = 3$

Projeção $\dfrac{\vec{u}}{\vec{v}} = \dfrac{5}{3} (-1, 1, 1) = \left(\dfrac{-5}{3}, \dfrac{5}{3}, \dfrac{5}{3}\right)$

d) $\vec{u} \cdot \vec{v} = (1, 2, 4) \cdot (-2, -4, -8) = -2 - 8 - 32 = (-42)$

$\|\vec{u}\|^2 = \sqrt{1^2 + 2^2 + 4^2}^{\,2} = \sqrt{21}^{\,2} = 21 \qquad$ Projeção $\dfrac{\vec{v}}{\vec{u}} = -2 \cdot (1, 2, 4) = (-2, -4, -8)$

$\to \dfrac{-42}{21} = -2$

9. a) $\vec{v} = (3, -6, 0)$ e $\vec{u} = (2, -2, 1)$ e Projeção $\dfrac{\vec{v}}{\vec{u}} = \dfrac{\vec{v} \cdot \vec{u}}{\|\vec{u}\|^2} \cdot \vec{u} = \vec{v} \cdot \vec{u} = 3 \cdot 2 + 12 + 0$

$\|\vec{u}\| = \sqrt{2^2 + 2^2 + 1^2} = \sqrt{9} = 3 \cdot 3 = 9 \qquad \dfrac{18}{9} = 2 \to$ Proj $\dfrac{\vec{v}}{\vec{u}} = \dfrac{\vec{v} \cdot \vec{u}}{\vec{u}} \cdot \vec{u} = 2(2, -2, 1)$

b) $\vec{p}$ é paralelo a $\vec{u}$, então $\vec{p} = \lambda(\vec{u})$

$\vec{v} = \lambda(\vec{u}) + \vec{q} \qquad \lambda(2, -2, 1) = (4, -4, 2) \quad \boxed{\lambda = 2} \qquad \vec{p} = (4, -4, 2)$

$\vec{q} = \vec{v} - \lambda\vec{u} \qquad \vec{q} = (3, -6, 0) - (4, -4, 2) = (-1, -2, -2)$

tilibra

c) Área $= \|\vec{u} \times \vec{v}\|$

$\to \|(2\vec{i} - 2\vec{j} + k) \times (3\vec{i} - 6\vec{i})\|$

$\to \|(-6)\vec{i} - 18\vec{j} + 16K\|$

$= \sqrt{-6^2 + (-18)^2 + 16^2}$

$= \sqrt{36 + 324 + 256}$

$= \sqrt{676}$

10.a) $\begin{bmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3 & 3 & 0 \\ 5 & 4 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 0 \\ 4 & 0 \end{bmatrix} - \vec{j} \begin{bmatrix} 3 & 0 \\ 5 & 0 \end{bmatrix} + \vec{k} \begin{bmatrix} 3 & 3 \\ 5 & 4 \end{bmatrix} = i = 0$

$j = 0$

$k = -3$

$(0, 0, -3) \to$

$\to \sqrt{-3^2} = \sqrt{9} = 3$

b) $\begin{bmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 8 & -5 \\ 1 & 2 & -1 \end{bmatrix} = i = (0 - (-10)) = 10$

$-j = (-7 + 5) = 2$

$k = (14 - 0) = 14 \to (10, 2, 14)$

$\sqrt{10^2 + 2^2 + 14^2} = \sqrt{100 + 4 + 196} = \sqrt{200}$

c) $\begin{bmatrix} i & j & k \\ 1 & 3 & 1 \\ 1 & 1 & 4 \end{bmatrix} = i = (-12 - 1) = -13$

$-j = (4 - 1) = -3 \to (-13, -3, 4)$ $\sqrt{-13^2 + (-3)^2 + 4^2} = \sqrt{169 + 9 + 16} = \sqrt{194}$

$k = (1 + 3) = 4$

d) $\begin{bmatrix} i & j & k \\ 2 & 9 & 2 \\ 4 & 2 & 4 \end{bmatrix} = i = (4 - 4) = 0$

$-j = (8 - 8) = 0 \to (0, 0, 0)$

$k = (4 - 4) = 0$

11.a) $\|\vec{u} \cdot \vec{v}\|^2 = (\vec{u} \cdot \vec{v}) \cdot (\vec{u} \cdot \vec{v}) + (\vec{u} \cdot \vec{v}) \cdot (\vec{u} \cdot \vec{v}) = (\vec{u} \cdot (\vec{u} \cdot \vec{v})) (\vec{u} \cdot (\vec{u} \cdot \vec{v})) = 0$

$\|\vec{u} \times \vec{v}\|^2 = 0 \quad \|\vec{u} \cdot \vec{v}\|^2 = \|\vec{u}\|^2 \cdot \|\vec{v}\|^2 \to (\|\vec{u}\|^2 \cdot \|\vec{v}\|^2 - \|\vec{u} \cdot \vec{v}\|)^2$

12.a $\begin{cases} \vec{x} \cdot (2i + 3j + 4k = 9 \\ \vec{x} \cdot (-i + j - k) = -2i + 2k \end{cases} \to \begin{cases} (ai + bj + ck) = (2i + 3j + 4k) = 9 \\ (ai + bj + ck)(-i - 0 - k) = -2i + 2k \end{cases}$

Por matriz

$\begin{bmatrix} i & j & k \\ a & b & c \\ -1 & 1 & -1 \end{bmatrix} = -2i + 2k \to i = (-b - c)$, $-j = (-a + c)$, $k = (a + b)$ $\to ((-b - c), (a - c), (a + b)) = (-2, 0, 2)$

b) $\begin{cases} \vec{x} \cdot (1, 0, 1) = (2, 2, -2) \\ \|\vec{x}\| = \sqrt{6} \end{cases} = \begin{cases} (a, 0, ck) = (2, 2, -2) \\ \sqrt{a^2 + b^2 + c^2} = \sqrt{6} \end{cases}$

$\begin{bmatrix} i & j & k \\ a & b & c \\ 1 & 0 & 1 \end{bmatrix} = (2, 2, -2) \to i = (b - 0)$, $-j = (a - c)$, $k = (0 - b)$ $\to ((b)i + (-a + c)j + (-b)k) = (2, 2, -2)$

$\begin{cases} b = 2 \\ -a + c = 2 \\ -b = -2 \end{cases}$ $\to b = 2$, $\to c = 2 + a$ solução: $\begin{cases} a = -1 \\ b = 2 \\ c = 1 \end{cases}$

$\sqrt{a^2 + b^2 + c^2} \to \sqrt{a^2 + 2^2 + (2 + a)^2} = \sqrt{6} \to a^2 + 4 + 4 + 4a + a^2 = 6$

$2a^2 + 4a + 2 = 0$

$\Delta = 4^2 - 4 \cdot 2 \cdot 2$

$\Delta = 0$

$\frac{-4 \pm \sqrt{0}}{4} = \frac{-4}{4} = -1$

c) $\sqrt{a^2 + b^2 + c^2} = \sqrt{3}$ $\quad \vec{x} \cdot \vec{v} = a(-3) + 3c = 0$

$\vec{x} \cdot \vec{v} = a(2) + b(-2) = 0$

Dado que $\|\vec{j}\| = 1$

Para o ângulo obtuso, o $\cos \theta$ é negativo, então $b < 0$!

43 - a) Área = base · altura

$\vec{AB} = B - A = (1, 1, 1) - (3, 2, 1) = (-2, -1, 0)$

$\vec{AD} = D - A = (5, 3, 3) - (3, 2, -1) = (2, 1, 4)$

$AB \times AD = \begin{bmatrix} i & j & k \\ -2 & -1 & 0 \\ 2 & 1 & 4 \end{bmatrix} = \begin{matrix} i = (-4 + 0) = -4 \\ -j = (-8 + 0) = 8 \\ k = (-2 + 2) = 0 \end{matrix}$ $\rightarrow \|AB \times AD\| = \sqrt{-4^2 + 8^2} = \sqrt{16 + 64} = \sqrt{80}$

b) Base · altura / 2

$Área = \frac{1}{2} \|\vec{AB} \times \vec{AC}\| \rightarrow \begin{bmatrix} i & j & k \\ -1 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix} = \begin{matrix} i = (3 - 0) = 3 \\ -j = (-3 + 0) = 3 \\ k = (-1 + 0) = -1 \end{matrix} = (3, 3, -1)$

$\sqrt{3^2 + 3^2 + 1^2} = \sqrt{9 + 9 + 1} = \frac{\sqrt{19}}{2}$

44 - Produto Misto

$[\vec{u}, \vec{v}, \vec{w}]$ para $\vec{u} = (1, 3, 2)$, $\vec{v} = (0, 1, -2)$ e $w = (-1, 2, 0)$

$[\vec{u}, \vec{v}, \vec{w}] = \vec{u} \cdot (\vec{v} \times \vec{w})$

$\vec{v} \times \vec{w} = \begin{bmatrix} i & j & k \\ 0 & 1 & -2 \\ -1 & 2 & 0 \end{bmatrix} = \begin{matrix} i = (0 - (-4)) = 4 \\ -j = (0 - 2) = 2 \\ k = (0 - (-1)) = 1 \end{matrix}$ $\quad [\vec{u}, \vec{v}, \vec{w}] = (1, 3, 2) \cdot (4, 3, 1) = (4 + 9 + 2) = 15$

b) $[\vec{u}, \vec{v}, \vec{w}] = det = \begin{bmatrix} 1 & 3 & 2 \\ 0 & 1 & -2 \\ -1 & 2 & 0 \end{bmatrix} \rightarrow L_1 \leftrightarrow L_2 \rightarrow L_2 \leftrightarrow L_3 = \begin{bmatrix} -1 & 2 & 0 \\ -1 & 2 & 0 \\ 1 & 3 & 2 \end{bmatrix} \rightarrow L_2 \, 2 = \begin{bmatrix} -1 & 2 & 0 \\ 2 & 4 & 0 \\ 1 & 3 & 2 \end{bmatrix}$

c) $[\vec{u}, 3\vec{v} - 2\vec{v}, \vec{w} + 3\vec{u}]$

$3\vec{v} - 2\vec{v}$ e $w + 3\vec{u}$

$\begin{bmatrix} 1 & 3 & 2 \\ -2 & -3 & -10 \\ 2 & 11 & 6 \end{bmatrix} \Rightarrow \begin{matrix} det = 1 \cdot (-18 + 110) = 92 \\ det = -3(-12 + 20) = 24 \\ det = 2(-22 + 6) = -32 \end{matrix} \rightarrow 36$

16 - a) $\vec{AF} \times \vec{AB} = \begin{bmatrix} i & j & k \\ 3 & 5 & 6 \\ 1 & 0 & 1 \end{bmatrix} = \begin{matrix} i = (5 - 0) = 5 \\ -j = (3 - 6) = 3 \\ k = (0 - 5) = -5 \end{matrix}$

$\|\vec{AF} \times \vec{AB}\| = \sqrt{5^2 + 3^2 + (-5)^2} = \sqrt{25 + 9 + 25} = \sqrt{59}$

b) $\vec{AE} \cdot (\vec{AF} \times \vec{AB})$

$\vec{AE} = (2, 2, 2) \cdot (5, 3, -5)$

$\vec{AE} = (10 + 6 + (-10)) = 6$

c) $\begin{bmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 0 & 1 \\ 2 & 2 & 0 \end{bmatrix} = \begin{matrix} i = (0 - 2) = -2 \\ -j = (2 - 2) = 0 \\ k = (2 - 0) = 2 \end{matrix}$ $\quad$ altura $= \frac{AE \cdot (-2, 0, 2)}{\|(-2, 0, 2)\|}$

$\rightarrow \vec{AE} \cdot M = (3 \cdot (-2), 0 \cdot 6, 2) = (-6, 0, 12) = 6 \rightarrow \|M\| = \sqrt{2^2 + 2^2} = \sqrt{4 + 4} = \sqrt{8} = \frac{6}{\sqrt{8}}$

d) 1/6 da figura $1/6 \cdot 6 = 1$ //