01) $|A| = \cos(x) \cdot \cos(y) \cdot \text{sen}\left(y, \frac{\pi}{2}\right)$

$* \text{ sen}\left(y, \frac{\pi}{2}\right) = \text{sen}(y) \cdot \cos\left(\frac{\pi}{2}\right) + \text{sen}\left(\frac{\pi}{2}\right) \cdot \cos(y) = \cos(y)$

$|A| = \cos(x) \cdot \cos^2(y)$

$|B| = \cos^2(y) \cdot \text{sen}(x)$

$|C| = \text{sen}^2(x) \cdot \cos(y) \cdot \text{sen}(y) + \cos^2(x) \cdot \text{sen}(y) \cdot \cos(y)$

$|C| = \cos(y) \cdot \text{sen}(y) \cdot [\text{sen}^2(x) + \cos^2(x)]$

$|C| = \cos(y) \cdot \text{sen}(y)$

$|A|^2 = \cos^2(x) \cdot \cos^4(y)$

$|B|^2 = \text{sen}^2(x) \cdot \cos^4(y)$

$|C|^2 = \cos^2(y) \cdot \text{sen}^2(y)$

$\sqrt{|A|^2 + |B|^2 + |C|^2} = \sqrt{\cos^2(x) \cdot \cos^4(y) + \text{sen}^2(x) \cdot \cos^4(y) + \cos^2(y) \cdot \text{sen}^2(y)}$

$= \sqrt{\cos^4(y)\,[\cos^2(x) + \text{sen}^2(x)] + \cos^2(y) \cdot \text{sen}^2(y)}$

$= \sqrt{\cos^4(y) \cdot 1 + \cos^2(y) \cdot \text{sen}^2(y)}$

$= \sqrt{\cos^2(y)\,[\cos^2(y) + \text{sen}^2(y)]}$

$= \sqrt{\cos^2(y)} = |\cos(y)|$

02) Ponto de intersecção da reta $y - 2x + 7 = 0$ com o eixo das ordenadas.

$x = 0$

$y = -7$

Focos da hipérbole:

$\frac{x^2}{4} - \frac{y^2}{12} = 1$

Eixo real horizontal e centro (0, 0)

$a^2 = 4$ e $b^2 = 12$

$c^2 = a^2 + b^2$

$c^2 = 16$

$c = 4$

Focos: $F_1(-4, 0)$ e $F_2(4, 0)$

Parábola: $y = ax^2 + bx + c$

Passa por $(0, -7) \rightarrow c = -7$

Passa por $(-4, 0)$ e $(4, 0) \rightarrow$ As raízes são $x = -4$ e $x = 4$

Usando as relações de Girard:

$\frac{a}{c} = -16 \rightarrow \frac{-7a}{c} = -16 \rightarrow a = \frac{7}{16}$

$\frac{-b}{a} = 0 \rightarrow b = 0$

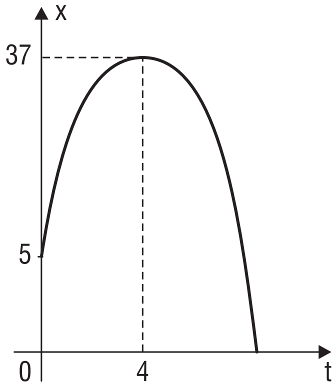
Parábola: $y = \frac{7}{16}x^2 - 7$

03) $V_{Tetraedro} = A_{Base} \cdot \frac{h}{3}$

$V_{Tetraedro} = \left[\left(\frac{x}{2}\right) \cdot \left(\frac{x}{2}\right) \cdot \left(\frac{1}{2}\right)\right] \cdot \left(\frac{x}{2}\right) \cdot \left(\frac{1}{3}\right)$

$V_{Tetraedro} = \left(\frac{x^3}{48}\right)$ u.v.

04) a)



b) $v = v_0 + a \cdot t$
$v = 16 - 4 \cdot 4$
$v = 0$

c) Aos 4 s, a bola pára e retorna. Logo, temos:

$t = 4$ s	$t = 5$ s
$x = 5 + 16 \cdot t - 2t^2$	$x = 5 + 16 \cdot t - 2t^2$
$x = 5 + 16 \cdot 4 - 2 \cdot 4^2$	$x = 5 + 16 \cdot 5 - 2 \cdot 5^2$
$x = 5 + 64 - 32$	$x = 5 + 80 - 50$
$x = 37$ m	$x = 35$ m
Distância percorrida 34 m	Deslocamento 30 m

05) a) $\Delta U = Q - W$
$Q = \Delta U + W$
$Q = \Delta U + P \cdot \Delta V$
$Q = 1000 + 10^5 \cdot 50 \cdot 10^{-4}$
$Q = 1000 + 500$
$Q = 1500$ J

b) Por se tratar de uma transformação isovolumétrica, o trabalho termodinâmico é nulo.

c) Em uma transformação isovolumétrica, tem-se:

$$\frac{p_B}{T_B} = \frac{p_C}{T_C}$$

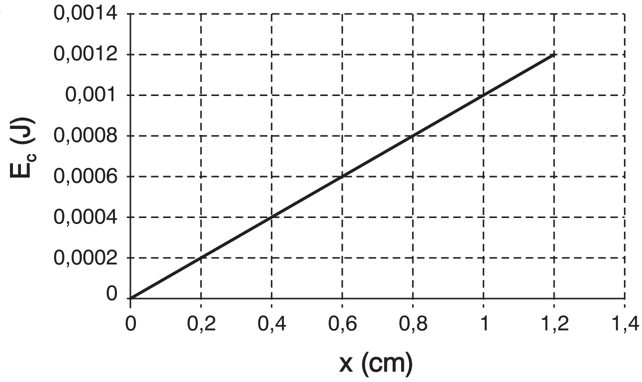
$$\frac{10^5}{350} = \frac{p_C}{700}$$

$$p_C = 2 \cdot 10^5 \text{ N/m}^2$$

06) a) $E_P = q \cdot V$
$0{,}0006 = 10^{-6} \cdot V$
$6 \cdot 10^{-4} = 10^{-6} \cdot V$
$V = 6 \cdot 10^2$ V

b) $W = -\Delta E_P$
$W = -(0{,}0004 - 0{,}001)$
$W = -(-0{,}0006)$
$W = 0{,}0006$ J

c)



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