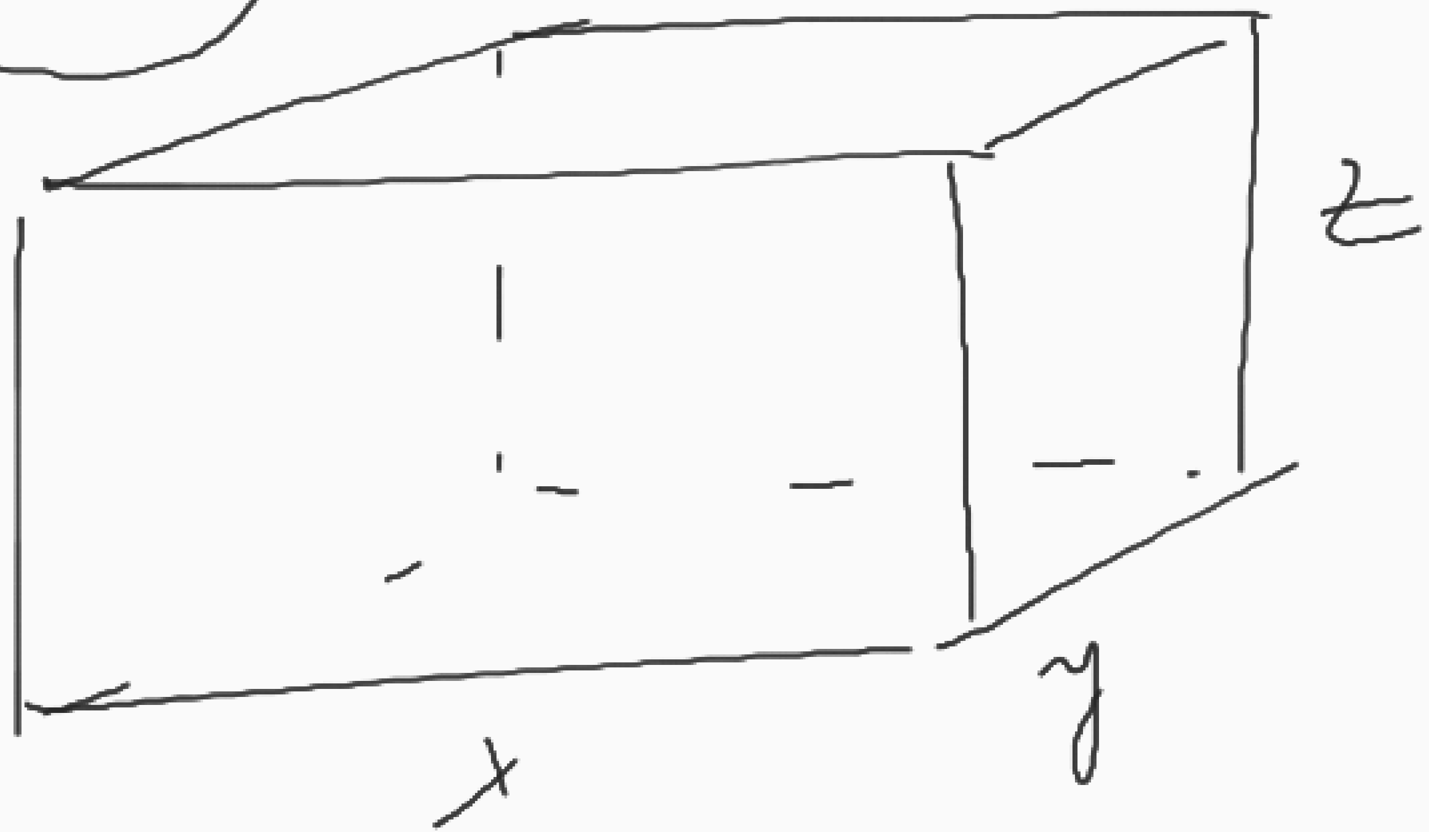
(PR1)



$V = 500\,m^3 \Rightarrow xyz = 500$

$z = \dfrac{500}{xy}$

$x = 2y$

$\boxed{x = 10\,m}$ $\qquad$ $\boxed{z = 10\,m}$

$C(x,y,z) = 3xy + 2(xz + yz)$

$$C(y) = 3(2y)y + \cancel{2}\left(2\cancel{y}\cdot\frac{500}{\cancel{2}y\cdot\cancel{y}} + \cancel{y}\cdot\frac{500}{\cancel{2}y\cdot\cancel{y}}\right)$$

$$\boxed{C(y) =} \; 6y^2 + \frac{1000}{y} + \frac{500}{y} = \boxed{6y^2 + \frac{1500}{y}}$$

$$\Rightarrow \frac{6y^3 + 1500}{y}$$

$$C'(y) = \frac{18y^2 y - (6y^3 + 1500)1}{y^2} =$$

$$= \frac{18y^3 - 6y^3 - 1500}{y^2}$$

$$\Rightarrow \frac{12y^3 - 1500}{y^2} = 0$$

$$12y^3 = 1500$$

$$y^3 = 125 \Rightarrow \boxed{y = 5m}$$

$$C''(y) = \frac{36y^2 \cdot y^2 - (12y^3 - 1500)2y}{y^4} =$$

$$= \frac{36y^4 - 24y^4 + 3000y}{y^4} =$$

$$= \frac{12y^4 + 3000y}{y^4} = \frac{12y^3 + 3000}{y^3}$$

$C''(5) > 0 \Rightarrow$ NAŠLI SME MINIMUM

PR2 $\quad S = 2\pi r h + 2\pi r^2 = \underline{\underline{2\pi r(h+r)}}$

$V = 1\ell \Rightarrow \pi r^2 h = 1$

$$h = \frac{1}{\pi r^2}$$

$$s(r) = 2\pi r\left(\frac{1}{\pi r^2} + r\right) = 2\cancel{\pi}\cancel{r}\left(\frac{1 + \pi r^3}{\cancel{\pi} r \cancel{2}}\right) =$$

$$= \frac{2 + 2\pi r^3}{r} = \frac{2}{r} + 2\pi r^2$$

$$\hookrightarrow 2r^{-1} + 2\pi r^2$$

$$\boxed{S'(r) = -\frac{2}{r^2} + 4\pi r}$$

$$S'(r) = 0 \Leftrightarrow 4\pi r - \frac{2}{r^2} = 0$$

$$\frac{4\pi r^3 - 2}{r^2} = 0$$

$$S''(r) = \frac{4}{r^3} + 4\pi$$

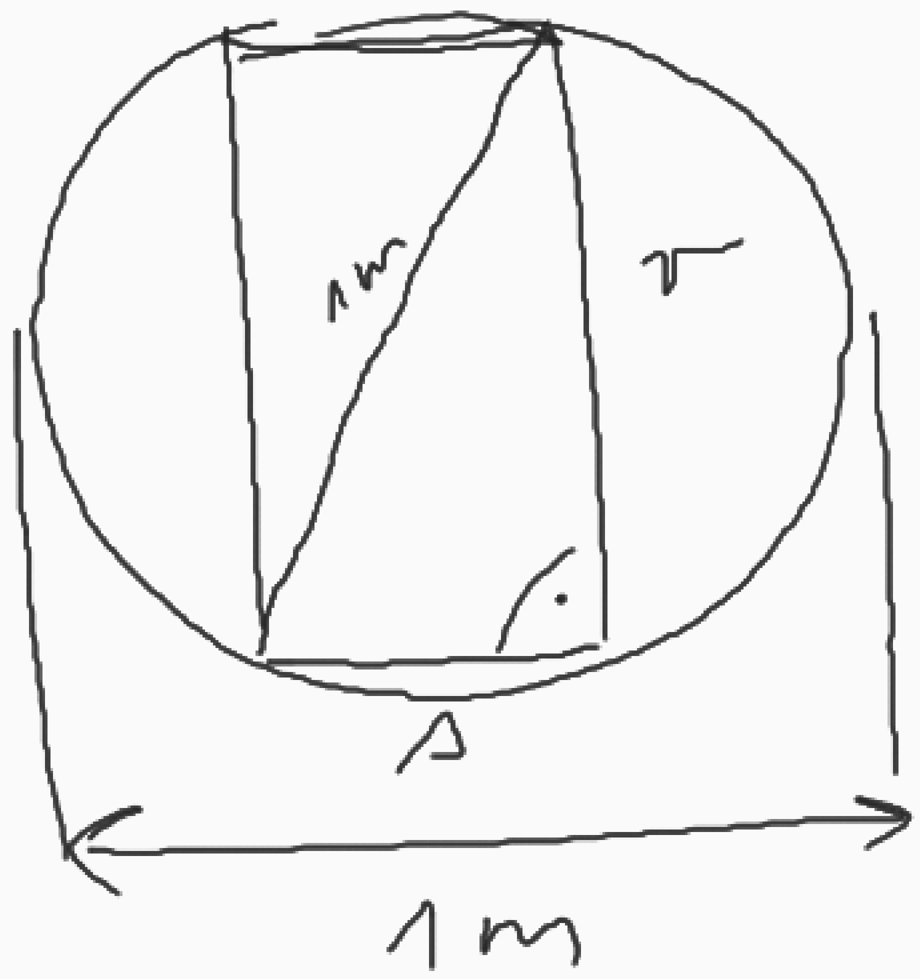
$$4\pi r^3 = 2$$

$$r^3 = \frac{1}{2\pi}$$

$$S''(r) > 0 \Rightarrow \text{NAŠLI SME MIN}$$

$$\boxed{r = \sqrt[3]{\frac{1}{2\pi}}}$$

PR 3



$N = c \cdot s \cdot r^2$; $c = konšt.$

$s^2 + r^2 = 1$

$r^2 = 1 - s^2$

$N(s) = c \cdot s(1 - s^2) =$

$= cs - cs^3$

$\boxed{N'(s) = c - 3cs^2}$ $\Rightarrow$ $\boxed{N''(s) = -6cs}$

$N'(s) = 0 \Leftrightarrow \cancel{c} - 3\cancel{c}s^2 = 0$

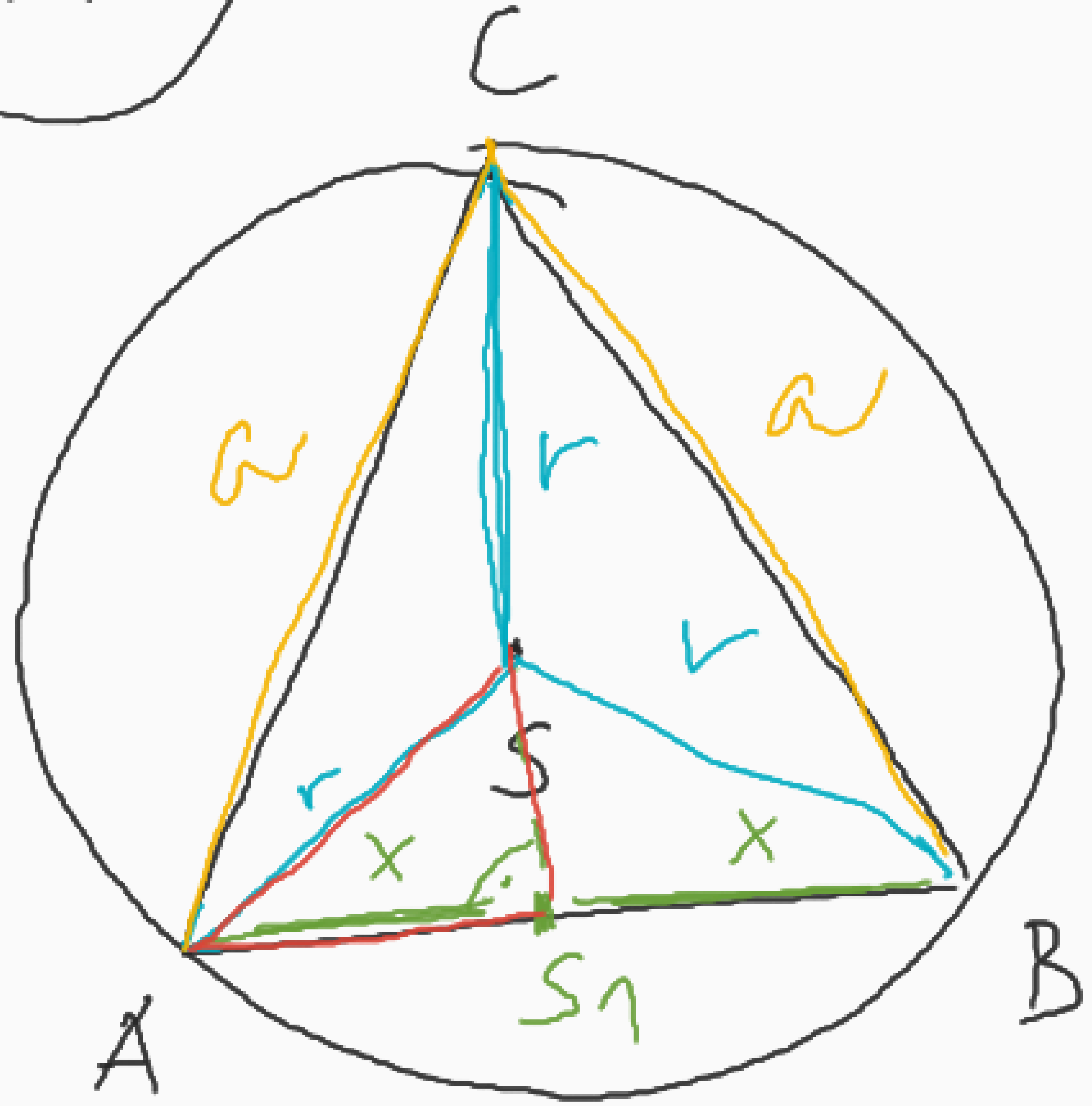
$s = \sqrt{\frac{1}{3}} = \frac{\sqrt{3}}{3}$

$N''(s) < 0$

MAX

PR 4

OBSAH MÁ BÝT MAX



$$P(x) = \frac{|S_1C| \cdot |AB|}{2}$$

x

$$\frac{a \cdot v_a}{2}$$

$$P(x) = \left(r + \sqrt{r^2 - x^2}\right) \cdot x$$

MAX

$$S_1C = r + \sqrt{r^2 - x^2}$$

$$P(x)' = \left[rx + \sqrt{r^2 - x^2} \cdot x\right]'_x$$

$$P'(x) = r + \frac{1}{\cancel{2}}(r^2-x^2)^{-\frac{1}{2}} \cdot (-\cancel{2}x) \cdot x + (r^2-x^2)^{\frac{1}{2}}$$

BUDEM DER. 2 KRAT

$$= r - \frac{x^2}{\sqrt{r^2-x^2}} + \sqrt{r^2-x^2} = \frac{r\sqrt{r^2-x^2} - x^2 + r^2 - x^2}{\sqrt{r^2-x^2}}$$

$$= \frac{r\sqrt{r^2-x^2} - 2x^2 + r^2}{\sqrt{r^2-x^2}}$$

$$P'(x) = 0 \Longleftrightarrow r\sqrt{r^2-x^2} - 2x^2 + r^2 = 0$$

$$r\sqrt{r^2-x^2} = 2x^2 - r^2 \qquad /^2$$

$$r^2(r^2-x^2) = 4x^4 - 4x^2r^2 + r^4$$

$$\cancel{r^4} - r^2x^2 = 4x^4 - 4x^2r^2 + \cancel{r^4}$$

$$4x^4 - 3x^2r^2 = 0$$

$$x^2(4x^2-3r^2)=0$$

$$x=0 \; ; \quad \boxed{x = \frac{\sqrt{3}\,r}{2}}$$

$$P''(x) = \left[r - x^2 (r^2 - x^2)^{-\frac{1}{2}} + (r^2 - x^2)^{\frac{1}{2}} \right]'_x$$

$$P''(x) = 0 - 2x(r^2 - x^2)^{-\frac{1}{2}} - x^2\left(-\frac{1}{\cancel{2}}\right)(r^2 - x^2)^{-\frac{3}{2}} \cdot (-\cancel{2}x)$$

$$+ \frac{1}{\cancel{2}}(r^2 - x^2)^{-\frac{1}{2}} \cdot (-\cancel{2}x) =$$

$$= \frac{-2x}{\sqrt{r^2 - x^2}} - \frac{x^3}{\sqrt[3]{(r^2 - x^2)^2}} - \frac{x}{\sqrt{r^2 - x^2}} < 0$$

NAŠLI SME MAXIMUM

PR5

$V = x\,y\,z$

$V = (60-2a)\cdot(28-2a)\cdot a$

$\Downarrow$

TOTO TREBA ZDERIVOVAŤ A VYJADRIŤ "a"

PR9

$s(t) = 6t^2 - t^3$

$s'(t) = 12t - 3t^2 \Rightarrow 12t_0 - 3t_0^2 = 0 \Rightarrow$

ČAS KEDY TELESO ZASTANE ($v=0$)

$t_0 (\underbrace{12 - 3t_0}) = 0$

$t_0 = 0$

$12 - 3t_0 = 0$

$\boxed{t_0 = 4\,h}$

$s''(t) = 12 - 6t \Rightarrow 12 - 6t_1 = 0$

ČAS KEDY $a = 0$

$\boxed{t_1 = 2\,h}$