Cvičení 1

1) $V = 30 \cdot 30 \cdot 500 - 4 \cdot \pi \cdot 5^2 \cdot 30 \ (cm^3)$

$\rho = 860 \ kg/m^3 = 860 \cdot 10^{-6} \ kg/cm^3$

$m = V \cdot \rho \doteq \underline{378,89 \ kg}$

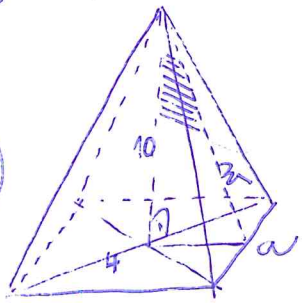
2) $V = 450 \ dm^3$ $\qquad r = \frac{2}{3} v$

$V = \pi r^2 \cdot v = \pi \cdot \left(\frac{2}{3} v\right)^2 \cdot v = \pi \cdot \frac{4}{9} v^3$

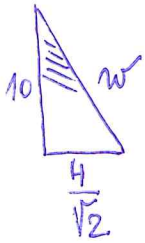
$\pi \cdot \frac{4}{9} v^3 = 450 \rightarrow v = \sqrt[3]{322,29} \doteq 6,86 \rightarrow r \doteq 4,57$

$S = 2 \cdot \pi r^2 + 2 \cdot 2\pi r v \doteq \underline{525,18 \ dm^2}$

3) a)



$w = a \cdot \sqrt{2} \rightarrow a = \frac{w}{\sqrt{2}} = \frac{8}{\sqrt{2}}$



$w = \sqrt{100 + \left(\frac{4}{\sqrt{2}}\right)^2} = \sqrt{108} \doteq 10,39$

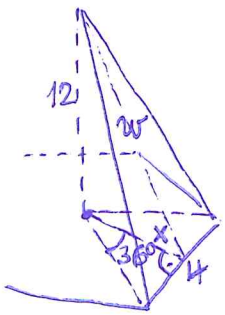
$S_{\square} = \frac{w^2}{2} = \frac{64}{2} = 32$

$S_{\triangle} = \frac{a \cdot w}{2} = \frac{\frac{8^4}{\sqrt{2}} \cdot \sqrt{108}}{8_1} = 4 \cdot \sqrt{54} \doteq 29,39$

$V = \frac{1}{3} S_{\square} \cdot v = \frac{1}{3} \cdot 32 \cdot 10 = \underline{106,6 \ cm^3}$

$S = S_{\square} + 4 \cdot S_{\triangle} = 32 + 16 \cdot \sqrt{54} \doteq \underline{149,58 \ cm^2}$

b)



$\operatorname{tg} 36^\circ = \frac{2}{x} \rightarrow x = \frac{2}{\operatorname{tg} 36^\circ} \doteq 2,75$

$w = \sqrt{12^2 + \left(\frac{2}{\operatorname{tg} 36^\circ}\right)^2} \doteq 12,31$

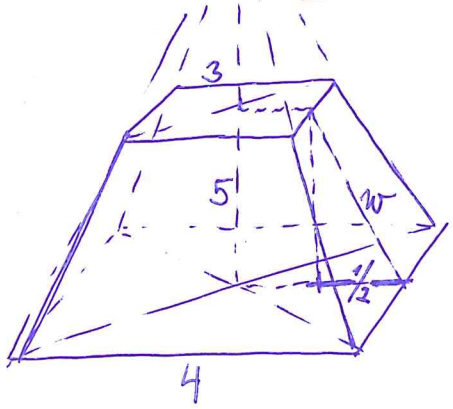
$S_p = \frac{4 \cdot 2{,}75}{2} \cdot 5 \doteq 27{,}50$

$S_\Delta = \frac{4 \cdot 12{,}31}{2} \doteq 24{,}62$

$S = S_p + 5 \cdot S_\Delta \doteq \underline{150{,}6 \text{ cm}^2}$

$V = \frac{1}{3} S_p \cdot v \doteq \underline{110{,}1 \text{ cm}^3}$

c)



$S_{p_1} = 16, \; S_{p_2} = 9$

$w = \sqrt{\left(\frac{1}{2}\right)^2 + 5^2} \doteq 5{,}025$

$S_{\square} = \frac{(4+3) \cdot 5{,}025}{2}$

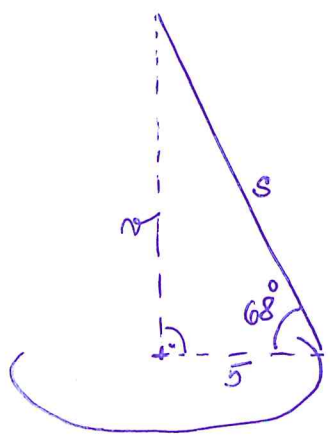
$S = S_{p_1} + S_{p_2} + 4 \cdot S_{\square} \doteq \underline{95{,}35 \text{ cm}^2}$

$V = \frac{1}{3} v \left(S_{p_1} + \sqrt{S_{p_1} \cdot S_{p_2}} + S_{p_2} \right) \doteq \underline{61{,}6 \text{ cm}^3}$

4) $0{,}945 = \frac{1}{3} \cdot v \cdot \left(1{,}2^2 + \sqrt{1{,}2^2 \cdot 0{,}3^2} + 0{,}3^2 \right) \rightarrow$

$\underline{v = 1{,}5 \text{ m}}$

5)



$V = \frac{1}{3} S_p \cdot v \qquad S = \pi r^2 + \pi r \cdot s$

$\cos 68° = \frac{5}{s} \rightarrow s \doteq 13{,}35$

$\lg 68° = \frac{v}{5} \rightarrow v \doteq 12{,}38$

$V = \frac{1}{3} \pi \cdot 25 \cdot 12{,}38 \doteq \underline{324{,}11 \text{ cm}^3}$

$S = \pi \cdot 25 + \pi \cdot 5 \cdot 13{,}35 \doteq \underline{288{,}24 \text{ cm}^2}$

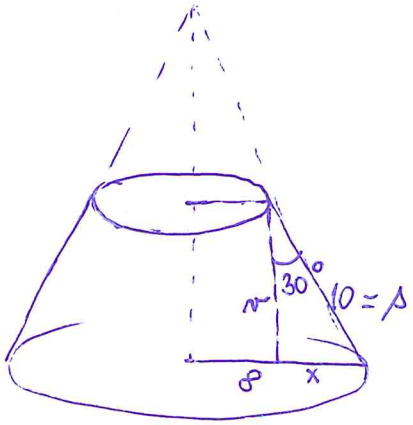
6) hranol : $V = 50 \cdot 50 \cdot 150 = 375\,000\ cm^3$

kužel : $V = \frac{1}{3}\pi \cdot 25^2 \cdot 50 \doteq 32724{,}92\ cm^3$ $\quad V \doteq 342\,275{,}1\ cm^3$

$S = 2 \cdot 50 \cdot 50 + 4 \cdot 50 \cdot 150 - \pi \cdot 25^2 + \pi \cdot 25 \cdot 55{,}90 \doteq 37427\ cm^2$

$s = \sqrt{50^2 + 25^2} \doteq 55{,}90$

7)



$V = \frac{1}{3}\pi \cdot v \cdot (r_1^2 + r_1 \cdot r_2 + r_2^2)$

$S = S_{p_1} + S_{p_2} + \pi(r_1 + r_2) \cdot s$

$\sin 30° = \frac{x}{10} \rightarrow x = 5$

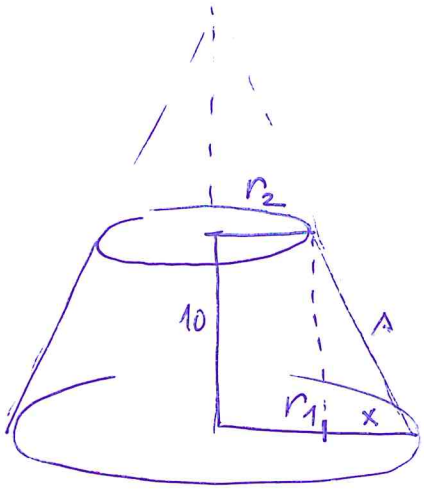
$r_2 = 8 - x = 3$

$\cos 30° = \frac{v}{10} \rightarrow v = 10 \cdot \frac{\sqrt{3}}{2} = 5\sqrt{3}$

$V = \frac{1}{3} \cdot \pi \cdot 5\sqrt{3}\,(8^2 + 8 \cdot 3 + 3^2) \doteq 879{,}69\ cm^3$

$S = \pi \cdot 8^2 + \pi \cdot 3^2 + \pi(8+3) \cdot 10 \doteq 574{,}91\ cm^2$

8)



$48{,}54 = \pi r_2^2 \rightarrow r_2 \doteq 5$

$56{,}55 = 2 \cdot \pi \cdot r_1 \rightarrow r_1 \doteq 9$

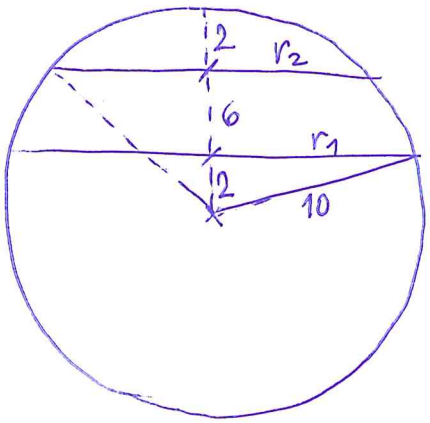
$x = 4$

$s = \sqrt{4^2 + 10^2} \doteq 10{,}77$

$V = \frac{1}{3}\pi \cdot 10 \cdot (9^2 + 9 \cdot 5 + 5^2) \doteq 1581{,}27\ cm^3$

$S = \pi \cdot 9^2 + \pi \cdot 5^2 + \pi(9+5) \cdot 10{,}77 \doteq 806{,}4\ cm^2$

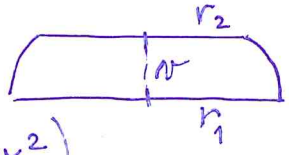
9)



a) $V = \frac{4}{3}\pi \cdot 10^3 \doteq 4188{,}79\ cm^3$

$S = 4\pi \cdot 10^2 \doteq 1256{,}64\ cm^2$

b) kulová vrstva



$v = 6$

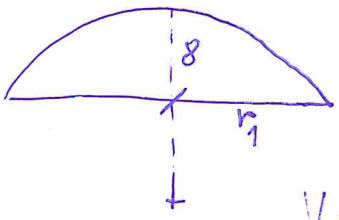
$r_1 = \sqrt{10^2 - 2^2} \doteq 9{,}8$

$r_2 = \sqrt{10^2 - 8^2} = 6$

$V = \frac{\pi v}{6}(3r_1^2 + 3r_2^2 + v^2)$

$V = \frac{\pi \cdot 6}{6}(3 \cdot 9{,}8^2 + 3 \cdot 6^2 + 36) \doteq 1357{,}55\ cm^3$

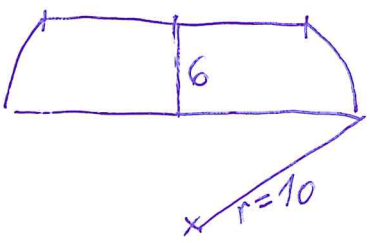
kužel



$V = \frac{\pi \cdot v}{6}(3r_1^2 + v^2)$

$V = \frac{\pi \cdot 8}{6}(3 \cdot 9{,}8^2 + 8^2) \doteq 1474{,}96\ cm^3$

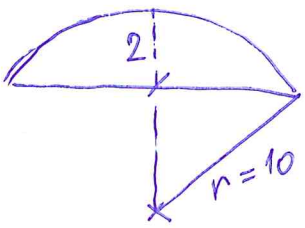
c)



kulový pás:

$S = 2\pi r v$

$S = 2 \cdot \pi \cdot 10 \cdot 6 \doteq 376{,}66\ cm^2$

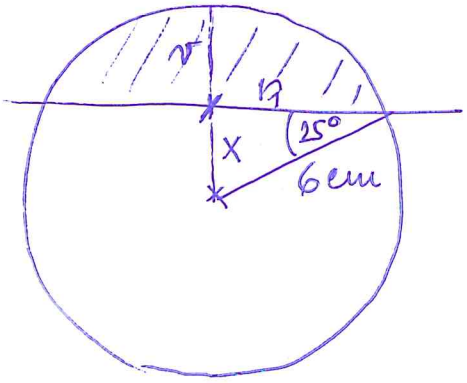


vrchlík:

$S = 2\pi r v$

$S = 2 \cdot \pi \cdot 10 \cdot 2 \doteq 125{,}66\ cm^2$

10)



$\sin 25° = \frac{x}{6} \rightarrow x \doteq 2{,}54$

$\cos 25° = \frac{r_1}{6} \rightarrow r_1 \doteq 5{,}44$

$v = r - x \doteq 3{,}46$

$V = \frac{\pi \cdot 3{,}46}{6}\left(3 \cdot 5{,}44^2 + 3{,}46^2\right) \doteq \underline{\underline{182{,}53}}\ cm^3$

$S = 2 \cdot \pi \cdot 6 \cdot 3{,}46 + \pi \cdot 5{,}44^2 \doteq \underline{\underline{223{,}41\ cm^2}}$