$$\frac{1}{2}V = \iint\limits_{D_1} z_{кон}\,dx\,dy + \iint\limits_{D_2-D_1} (z_{кон} - z_{цил})\,dx\,dy$$

$x = \rho\cdot\cos\varphi$

$y = \rho\cdot\sin\varphi$

$z_{кон} = \sqrt{\frac{x^2+y^2}{2}} = \frac{\rho}{\sqrt{2}}$

$z_{цил} = \sqrt{x^2+y^2-1} = \sqrt{\rho^2-1}$

$$\frac{1}{2}V = \int_0^{2\pi} d\varphi\cdot\int_0^1 \frac{\rho}{\sqrt{2}}\rho\,d\rho + \int_0^{2\pi} d\varphi \int_1^{\sqrt{2}} \left(\frac{\rho}{\sqrt{2}} - \sqrt{\rho^2-1}\right)\rho\,d\rho$$

$$= \frac{2\pi}{3\sqrt{2}} + \frac{2\pi}{3} - \frac{2\pi}{3\sqrt{2}} = \frac{2\pi}{3} \Rightarrow \boxed{V = \frac{4\pi}{3}}$$

$P = 2\cdot P_{кон} + 2\cdot P_{цил}$

$P_{кон} = \pi r l = \pi r\cdot\sqrt{2+1} = \pi\cdot\sqrt{2}\cdot\sqrt{3} = \sqrt{6}\pi$

$$P_{цил} = \iint\limits_{D_2-D_1} \sqrt{1+p^2+q^2}\,dx\,dy$$

$z_{цил} = \sqrt{x^2+y^2-1}$

$p = \frac{\partial z}{\partial x} = \frac{x}{\sqrt{x^2+y^2-1}}$, $q = \frac{\partial z}{\partial y} = \frac{y}{\sqrt{x^2+y^2-1}}$

$$P_{цил} = \iint\limits_{D_2-D_1} \sqrt{1+\frac{x^2}{x^2+y^2-1}+\frac{y^2}{x^2+y^2-1}}\,dx\,dy = \iint\limits_{D_2-D_1} \sqrt{\frac{x^2+y^2-1+x^2+y^2}{x^2+y^2-1}}\,dx\,dy$$

$$= \iint\limits_{D_2-D_1} \sqrt{\frac{2\cdot\rho^2-1}{\rho^2-1}}\,\rho\cdot d\varphi\,d\rho = \int_0^{2\pi} d\varphi\cdot\int_1^{\sqrt{2}} \sqrt{\frac{2\rho^2-1}{\rho^2-1}}\cdot\rho\,d\rho = \int_0^{2\pi} d\varphi\cdot I_1$$

$$I_1 = \int_1^{\sqrt{2}} \sqrt{\frac{2\rho^2-1}{\rho^2-1}}\cdot\rho\,d\rho = \int_1^{\sqrt{2}} \sqrt{\frac{2\cdot(\rho^2-\frac{1}{2})}{\rho^2-1}}\cdot\rho\,d\rho = \int_1^{\sqrt{2}} \sqrt{\frac{2\cdot(\rho^2-1+\frac{1}{2})}{\rho^2-1}}\cdot\rho\,d\rho =$$

$$= \sqrt{2}\int_1^{\sqrt{2}} \sqrt{\frac{\rho^2-1+\frac{1}{2}}{\rho^2-1}}\cdot\rho\,d\rho = \sqrt{2}\int_1^{\sqrt{2}} \rho\,d\rho + \underbrace{\int_1^{\sqrt{2}} \frac{\rho\,d\rho}{\sqrt{\rho^2-1}}}_{I_1} = \sqrt{2}\,\frac{\rho^2}{2}\Big|_1^{\sqrt{2}} + I_2$$

$$\sqrt{2} - \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2} + I_2$$

$$I_2 = \int_1^{\sqrt{2}} \frac{\rho\,d\rho}{\sqrt{\rho^2-1}} = \frac{1}{2}\int_1^{\sqrt{2}} \frac{d(\rho^2-1)}{\sqrt{\rho^2-1}} = \frac{1}{2}\int_1^{\sqrt{2}} (\rho^2-1)^{-\frac{1}{2}}\,d(\rho^2-1) = \frac{1}{2}\,\frac{(\rho^2-1)^{\frac{1}{2}}}{\frac{1}{2}}\Big|_1^{\sqrt{2}} =$$

$$= \sqrt{\rho^2-1}\Big|_1^{\sqrt{2}} = 1 \Rightarrow I_1 = 1 + \frac{\sqrt{2}}{2}$$

$$P_{цил} = \int_0^{2\pi} \left(1+\frac{\sqrt{2}}{2}\right) d\varphi = \left(1+\frac{\sqrt{2}}{2}\right)\varphi\Big|_0^{2\pi} = \left(1+\frac{\sqrt{2}}{2}\right)\cdot 2\pi \Rightarrow P_{бок\ цил} = (4+2\sqrt{2})\pi$$

$$\boxed{P = (2\sqrt{6}+2\sqrt{2}+4)\cdot\pi}$$