DN.

D N. IZRAČUNAJ $\int_\gamma u\,ds$ ZA $u(x,y,z) = x^2+y^2+z^2$

IN γ PODANO S PARAMETRIZACIJO $\vec{p}(t) = (a\cos t, a\sin t, bt)$

$t \in [0, 2\pi]$

$\vec{p}(t) = (a\cos t, a\sin t, bt)$

$\dot{\vec{p}}(t) = (-a\sin t, a\cos t, b)$

$\|\dot{\vec{p}}(t)\|^2 = a^2\sin^2 t + a^2\cos^2 t + b^2 = a^2+b^2$

$u(\vec{p}(t)) = a^2\cos^2 t + a^2\sin^2 t + b^2t^2 = a^2 + b^2t^2$

$$\int_\gamma u\,ds = \int_0^{2\pi} \underbrace{a^2+b^2t^2}_{u(\vec{p}(t))} \underbrace{\sqrt{a^2+b^2}}_{\|\dot{\vec{p}}(t)\|}\,dt = \sqrt{a^2+b^2}\int_0^{2\pi}(a^2+b^2t^2)\,dt$$

$$= \sqrt{a^2+b^2}\left[a^2t + b^2\frac{t^3}{3}\right]_0^{2\pi}$$

$$= \sqrt{a^2+b^2}\left[2\pi a^2 + \frac{b^2 8\pi^3}{3}\right]$$

$$= \frac{2\pi\sqrt{a^2+b^2}}{3}\left[3a^2 + 4b^2\pi^2\right]$$