

$$\begin{aligned} \mathbf{r}_u &= \cos v \mathbf{i} + \sin v \mathbf{j}, \mathbf{r}_v = -u \sin v \mathbf{i} + u \cos v \mathbf{j} + \mathbf{k} \Rightarrow \\ \mathbf{r}_u \times \mathbf{r}_v &= \sin v \mathbf{i} - \cos v \mathbf{j} + u \mathbf{k} \Rightarrow |\mathbf{r}_u \times \mathbf{r}_v| = \sqrt{1 + u^2}, \text{ so} \\ \iint_S \sqrt{1 + x^2 + y^2} dS &= \int_0^{3\pi} \int_0^3 \sqrt{1 + u^2} \sqrt{1 + u^2} du dv = 36\pi. \end{aligned}$$