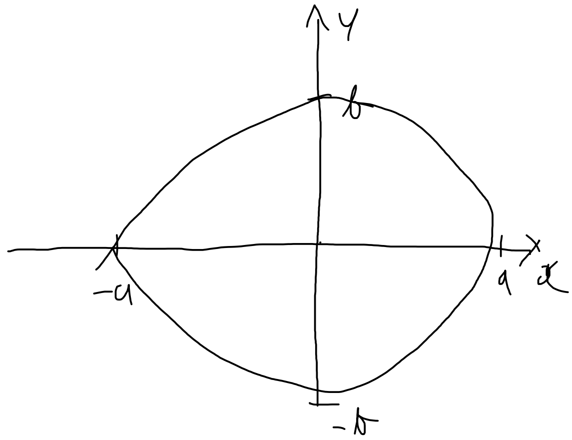
Área elipse

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}\le 1$$



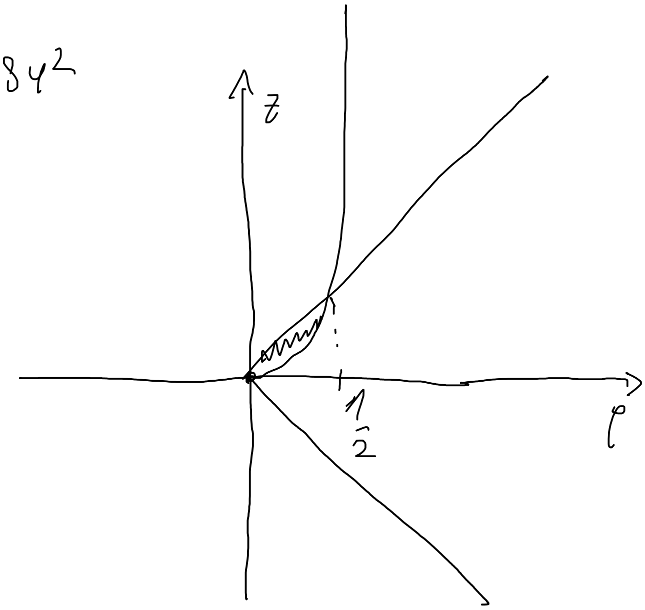
$$\begin{cases} x = aR\cos\theta \\ y = bR\sin\theta \end{cases}$$

$$\det = a\cdot b\,R$$

$$\int_0^1\int_0^{2\pi} 1\cdot abR\,d\theta\,dR = 2\pi ab\cdot\int_0^1 R\,dR = \pi ab$$

$$z^2 = x^2+4y^2 \quad \text{e} \quad z = 2x^2+8y^2$$

$$\begin{cases} x = \rho\cos\theta \\ y = \frac{1}{2}\rho\sin\theta \\ z = z \end{cases}$$



$$z^2 = \rho^2$$

$$z = 2\rho^2$$

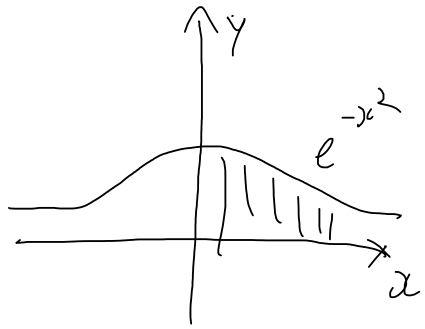
$$\rho = 2\rho^2$$

$$\Downarrow$$

$$\rho = \frac{1}{2}$$

$$\int_0^{2\pi}\int_0^{1/2}\int_{2\rho^2}^{\rho} \frac{1}{2}\rho\;dz\,d\rho\,d\theta =$$

$$I = \int_0^{+\infty} e^{-x^2}\,dx = \lim_{T \to +\infty} \int_0^T e^{-x^2}\,dx$$



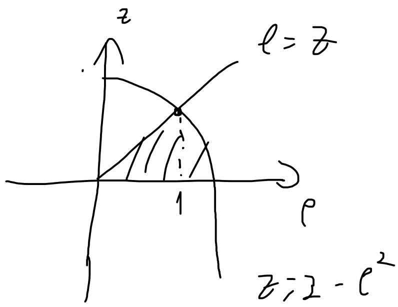
$$I^2 = \int_0^{+\infty} e^{-x^2}\,dx \int_0^{+\infty} e^{-y^2}\,dy = \int_0^{+\infty}\int_0^{+\infty} e^{-(x^2+y^2)}\,dy\,dx$$

$$I^2 = \int_0^{\pi}\int_0^{+\infty} e^{-R^2}\cdot R\,dR\,d\theta = \frac{\pi}{2}\lim_{T\to+\infty}\int_0^T e^{-R^2} R\,dR =$$

$$= \frac{\pi}{2}\lim_{T\to+\infty}\left[-\frac{1}{2}e^{-R^2}\right]_{R=0}^{R=T} = \frac{\pi}{4} \to \quad I = \frac{\sqrt{\pi}}{2}$$

$$V = \{(x,y,z) \in \mathbb{R}^3 : \sqrt{x^2+y^2} \geq z,\ z \leq 2 - x^2 - y^2,\ x,y,z \geq 0\}$$

$$\begin{cases} \rho \geq z \\ z \leq 2 - \rho^2 \\ z \geq 0 \\ 0 \leq \theta \leq \frac{\pi}{2} \end{cases} \qquad \rho = \sqrt{x^2+y^2}$$



$$\int_0^{\frac{\pi}{2}}\int_0^1\int_z^{\sqrt{2-z}} 1\cdot\rho\,d\rho\,dz\,d\theta$$