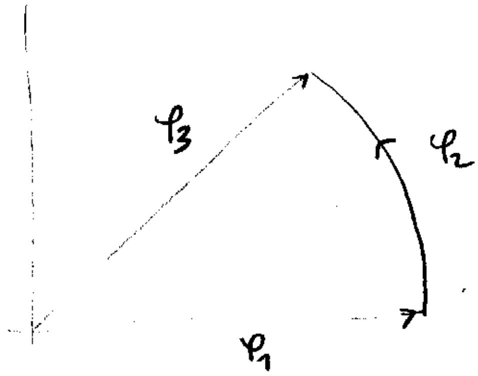
Fresnela:

$$0 = \int_{\Gamma} e^{iz^2}\,dz = \int_{\varphi_1} + \int_{\varphi_2} - \int_{\varphi_3}$$



$\varphi_1 = t\,,\ t \in [0, R]$

$\varphi_2 = Re^{it}\,;\ t \in [0, \pi/4]$

$\varphi_3 = te^{i\pi/4}\,;\ t \in [0, R]\,.$

$$\int_{\varphi_1} = \int_0^R e^{ix^2}\,dx = \int_0^R \cos x^2 + i \int_0^R \sin x^2 \longrightarrow I + iJ$$

$$\int_{\varphi_2} \to 0$$

$$\left(e^{i\pi/4}\right)^2 = e^{i\pi/2} = i$$

$$\int_{\varphi_3} e^{i(z^2)}\,dz = \int_0^R e^{i\left(te^{i\pi/4}\right)^2} e^{i\pi/4}\,dt$$

$$= \int_0^R e^{-t^2}\,dt \left(\frac{1+i}{\sqrt{2}}\right) \longrightarrow \frac{\sqrt{\pi}}{2} \cdot \frac{1+i}{\sqrt{2}}$$

$$\frac{\sqrt{\pi}}{2} \cdot \frac{(1+i)}{\sqrt{2}} = I + iJ\ ;\quad I, J = \frac{\sqrt{\pi}}{2\sqrt{2}}$$

$$I = \int_0^\infty \cos x^2$$

$$J = \int_0^\infty \sin x^2$$