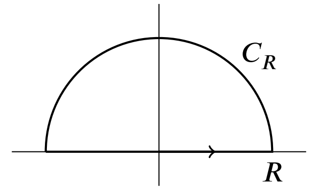
Quiz

1. Evaluate $\displaystyle\int_{C_R} \frac{e^{iz}}{(z^2+1)^2}\,dz$ by using the residue theorem (notice the double pole at i). Deduce that

$$\int_0^\infty \frac{\cos(x)}{(x^2+1)^2}\,dx = \frac{\pi}{2e}.$$



2. Show that $\displaystyle\lim_{N\to\infty} \int_{C_N} \frac{\pi}{z^2\sin(\pi z)}\,dz = 0$ (where N runs through the natural numbers). Then evaluate the integral by using the residue theorem. Deduce that

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2} = \frac{\pi^2}{12}.$$