All curves are positively oriented unless otherwise noted.

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1. Compute the following improper integrals:

$$(a)\ \int_0^\infty \frac{dx}{x^2+1}, \quad (b)\ \int_0^\infty \frac{dx}{(x^2+1)^2}, \quad (c)\ \int_0^\infty \frac{dx}{x^4+1}, \quad (d)\ \int_0^\infty \frac{\cos x dx}{x^2+1},$$

Notice that the functions are all even, so $\int_0^\infty \ldots = \frac{1}{2}\int_{-\infty}^\infty \ldots$.