



Math for the people, by the people.

Hankel contour integral

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Hankel's contour integral is a unit (and nilpotent) for gamma function over \mathbb{C} . That is,

$$\left(\frac{i}{2\pi} \int_{\mathcal{C}} (-t)^{-z} e^{-t} dt \right) \Gamma(z) = 1, \quad |z| < \infty.$$

Hankel's integral is holomorphic with simple zeros in $\mathbb{Z}_{\leq 0}$. Its path of integration starts on the positive real axis *ad infinitum*, rounds the origin counterclockwise and returns to $+\infty$. As an example of application of Hankel's integral, we have

$$\frac{i}{2\pi} \int_{\mathcal{C}} (-t)^{-\frac{1}{2}} e^{-t} dt = \frac{1}{\sqrt{\pi}},$$

where the path of integration is the one above mentioned.