

# methods of evaluating improper integrals\*

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2013-03-22 2:28:03

There are some general methods of evaluating improper integrals in such cases when one cannot directly use the antiderivative of the integrand. Which method is suitable in a certain instance, is dependent on the kind of the integral.

- Differentiation under the integral sign with respect to a parametre in the integrand; one can add a new parametre to a suitable place. The differentiated form may then be integrated directly or from a differential equation. Examples: a, b, c, d, e.
- Laplace transform. If the integrand has, as above, a parametre in a suitable place, the Laplace transform of the integrand with respect to this parametre is often simpler to integrate and the new improper integral to evaluate; thereafter one simply transforms inversely. Examples: f, g, h, i, j.
- Cauchy residue theorem. The integral may be obtained as limit of a contour integral in the complex plane. Examples: k, l, m, n.
- Expanding the integrand to series. Example: o.
- Changing variable in an improper integral sometimes may recur it to a known improper integral. Examples: p, q.

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\**(MethodsOfEvaluatingImproperIntegrals)* created: *(2013-03-2)* by: *(pahio)* version: *(41520)* Privacy setting: *(1)* *(Application)* *(40A10)*

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