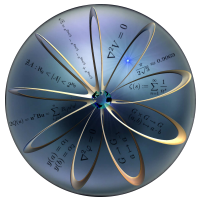

planetmath.org

Math for the people, by the people.

methods of evaluating improper integrals

Canonical name	MethodsOfEvaluatingImproperIntegrals
Date of creation	2014-11-07 19:12:16
Last modified on	2014-11-07 19:12:16
Owner	pahio (2872)
Last modified by	pahio (2872)
Numerical id	34
Author	pahio (2872)
Entry type	Application
Classification	msc 40A10
Related topic	IntegrationOfLaplaceTransformWithRespectToParameter
Related topic	ListOfImproperIntegrals
Related topic	IntegralRelatedToArcSine
Related topic	ExampleOfChangingVariable

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 http://planetmath.org/DefiniteIntegralintegral.

- 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: http://planetmath.org/twoimproperintegralsa, http://planetmath.org/generalisationofgaussianintegralb, http://planetmath.org
http://planetmath.org/integralrelatedtoarcsined, http://planetmath.org/node/11

- http://planetmath.org/laplacetransformLaplace 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 inversely. Examples: http://planetmath.org/sineintegralatinfinityf, http://planetmath.org/usingconvolutiontofindlaplacetransformg, http://planetmath.org/relativeofcosineintegralh, http://planetmath.org/laplace
http://planetmath.org/node/10637j.

- Cauchy residue theorem. The integral may be obtained as limit of a contour integral in the complex plane. Examples: http://planetmath.org/usingresidueth
http://planetmath.org/fresnelformulasl, http://planetmath.org/laplaceintegrals
http://planetmath.org/node/11489n.

- Expanding the integrand to series. Example: http://planetmath.org/applicationofloga

- http://planetmath.org/ChangeOfVariableInDefiniteIntegralChanging variable in an improper integral sometimes may recur it to a known improper integral. Examples: http://planetmath.org/areaundergaussiancurvep, http://planetmath.org/exampleofimproperintegralq, http://planetmath.org/exampl