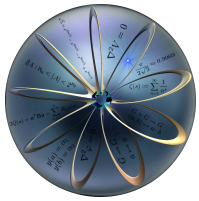

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list of improper integrals

Canonical name	ListOfImproperIntegrals
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Related topic	MethodsOfEvaluatingImproperIntegrals
Related topic	AreaFunctions
Related topic	ConvergenceOfIntegrals

Below, we list some http://planetmath.org/ConvergenceOfIntegralsconvergent improper integrals.

http://planetmath.org/areaundergaussiancurve**1.** $\displaystyle\int_0^\infty e^{-x^2}\,dx \;=\; \frac{\sqrt{\pi}}{2}$

http://planetmath.org/generalisationofgaussianintegral**2.** $\displaystyle\int_0^\infty e^{-x^2}\cos kx\,dx \;=\; \frac{\sqrt{\pi}}{2}e^{-\frac{1}{4}k^2}$

http://planetmath.org/usingconvolutiontofindlaplacetransform**3.** $\displaystyle\int_0^\infty \frac{e^{-x^2}}{a^2+x^2}\,dx \;=\; \frac{\pi}{2a}e^{a^2}\operatorname{erfc} a$

http://planetmath.org/fresnelformulas**4.** $\displaystyle\int_0^\infty \sin x^2\,dx \;=\; \int_0^\infty \cos x^2\,dx \;=\; \frac{\sqrt{2\pi}}{4}$

http://planetmath.org/sineintegralatinfinity**5.** $\displaystyle\int_0^\infty \frac{\sin ax}{x}\,dx \;=\; (\operatorname{sgn} a)\frac{\pi}{2} \qquad (a\in\mathbb{R})$

http://planetmath.org/twoimproperintegrals**6.** $\displaystyle\int_0^\infty \left(\frac{\sin x}{x}\right)^2 dx \;=\; \frac{\pi}{2}$

http://planetmath.org/twoimproperintegrals**7.** $\displaystyle\int_0^\infty \frac{1-\cos kx}{x^2}\,dx \;=\; \frac{\pi k}{2}$

http://planetmath.org/usingresiduetheoremnearbranchpoint**8.** $\displaystyle\int_0^\infty \frac{x^{-k}}{x+1}\,dx \;=\; \frac{\pi}{\sin \pi k} \quad (0<k<1)$

http://planetmath.org/exampleofchangingvariable**9.** $\displaystyle\int_{-\infty}^\infty \frac{e^{kx}}{1+e^x}\,dx \;=$

$\frac{\pi}{\sin \pi k} \quad (0 < k < 1)$

http://planetmath.org/exampleofusingresiduetheorem**10.** $\int_0^\infty \frac{\cos kx}{x^2+1}\,dx \;=\; \frac{\pi}{2e^k}$

http://planetmath.org/laplaceintegrals**11.** $\int_0^\infty \frac{a\cos x}{x^2+a^2}\,dx \;=\; \int_0^\infty \frac{x\sin x}{x^2+a^2}\,dx \;=\; \frac{\pi}{2e^a} \quad (a>0)$

http://planetmath.org/applicationofsineintegralatinfinity**12.** $\int_0^\infty \frac{\sin ax}{x(x^2+1)}\,dx \;=\; \frac{\pi}{2}(1-e^{-a}) \quad (a>0)$

http://planetmath.org/node/922313. $\int_0^\infty e^{-x}x^{-\frac{3}{2}}\,dx \;=\; \sqrt{\pi}$

http://planetmath.org/laplacetransformoftnft**14.** $\int_0^\infty e^{-x}x^3\sin x\,dx \;=\; 0$

http://planetmath.org/node/789115. $\int_0^\infty \left(\frac{1}{e^x-1}-\frac{1}{xe^x}\right)dx \;=\; \gamma$

http://planetmath.org/relativeofcosineintegral**16.** $\int_0^\infty \frac{\cos ax^2-\cos ax}{x}dx \;=\; \frac{\gamma+\ln a}{2} \quad (a>0)$

http://planetmath.org/relativeofexponentialintegral**17.** $\int_0^\infty \frac{e^{-ax}-e^{-bx}}{x}\,dx \;=\; \ln\frac{b}{a} \quad (a>0,\;\; b>0)$

http://planetmath.org/integralrelatedtoarcsine**18.** $\int_1^\infty \left(\arcsin\frac{1}{x}-\frac{1}{x}\right)dx \;=\; 1+\ln 2-\frac{\pi}{2}$

http://planetmath.org/exampleofimproperintegral**19.** $\int_0^1 \frac{\arctan x}{x\sqrt{1-x^2}}\,dx \;=\; \frac{\pi}{2}\ln(1+\sqrt{2}) \;=\; \frac{\pi}{2}\operatorname{arsinh}1$

http://planetmath.org/applicationoflogarithmseries**20.** $\displaystyle\int_0^1 \frac{\ln(1+x)}{x}\,dx \;=\; \frac{\pi^2}{12}$

21. $\displaystyle\int_{\frac{1}{2}}^1 \frac{\ln(1-x)}{x^2}\,dx \;=\; -2\ln 2$