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table of Fourier transforms

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Defines	Fourier-Stieltjes generalization of FT

Below are tables of <http://planetmath.org/FourierTransform> Fourier transforms; one lists some of the common properties, and the other lists some common examples.

Properties

Original	Transformed	comment	derivation
$af(t) + bg(t)$	$a\mathcal{F}\{f(t)\} + b\mathcal{F}\{g(t)\}$	linearity	
$f(t) * g(t)$	$\mathcal{F}\{f(t)\}\mathcal{F}\{g(t)\}$	convolution property	
$f(t + \alpha)$	$F(s) \exp(-i\alpha s)$	time shift, where $F(s) = \mathcal{F}\{f(t)\}$	
$f'(t)$	$is\mathcal{F}\{f(t)\}$	differentiation	
$\overline{f(t)}$	$\overline{F(-s)}$	conjugation, where $F(s) = \mathcal{F}\{f(t)\}$	
$f(\alpha t)$	$\frac{1}{ \alpha } F(\frac{s}{\alpha})$	scaling, where $F(s) = \mathcal{F}\{f(t)\}$ with $\alpha \neq 0$	

Examples

$f(t)$	$\mathcal{F}\{f(t)\}$	conditions	explanation	derivation
$\delta(t)$	1		Dirac delta function	
1	$2\pi\delta(s)$			
e^{iat}	$2\pi\delta(s - \alpha)$	$a \in \mathbb{R}$		
$\cos(at)$	$\pi(\delta(s + a) + \delta(s - a))$	$a \in \mathbb{R}$		
$\sin(at)$	$i\pi(\delta(s + a) - \delta(s - a))$	$a \in \mathbb{R}$		