> with(inttrans);

[addtable, fourier, fouriercos, fouriersin, hankel, hilbert, invfourier, invhilbert, invlaplace, **(1)**
    invmellin, laplace, mellin, savetable]

Funktionen $f = f(t)$

> $f := \exp\left(-\dfrac{t^2}{20}\right) \cdot \cos(2 \cdot t);$

$$f := e^{-\frac{1}{20}t^2} \cos(2t) \qquad (2)$$

> $plot(f, t = -10 .. 10);$
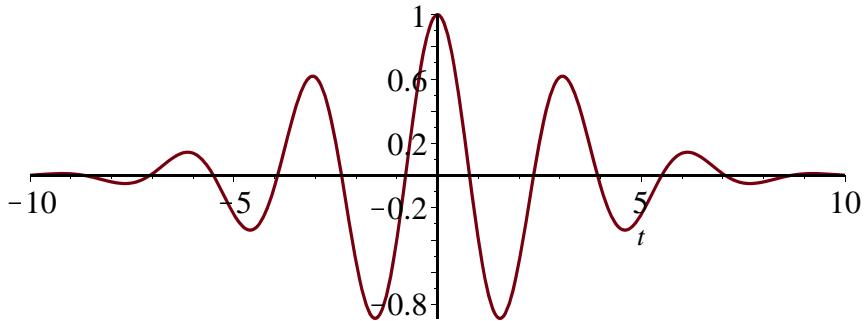
och dess Fouriertransform $F = F(w)$

> $F := fourier(f, t, w);$

$$F := 2\sqrt{5}\,\sqrt{\pi}\,\cosh(20\,w)\,e^{-5w^2 - 20} \qquad (3)$$

> $plot(F, w = -10 .. 10);$
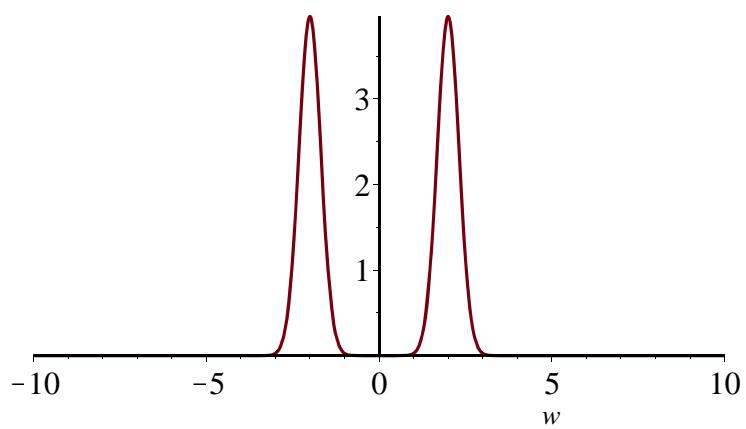
Funktionen $g = g\,(t)$

> $g := \left(\dfrac{\cos(2\,t\,)}{1 + 0.5 \cdot |t|} + \dfrac{\sin(\mathrm{Pi} \cdot t)}{1 + 0.5 \cdot |t|} \right);$

$$g := \frac{\cos(2\,t)}{1 + 0.5\,|t|} + \frac{\sin(\pi\,t)}{1 + 0.5\,|t|} \tag{4}$$

> $plot(g, t = {-}10\, ..10);$
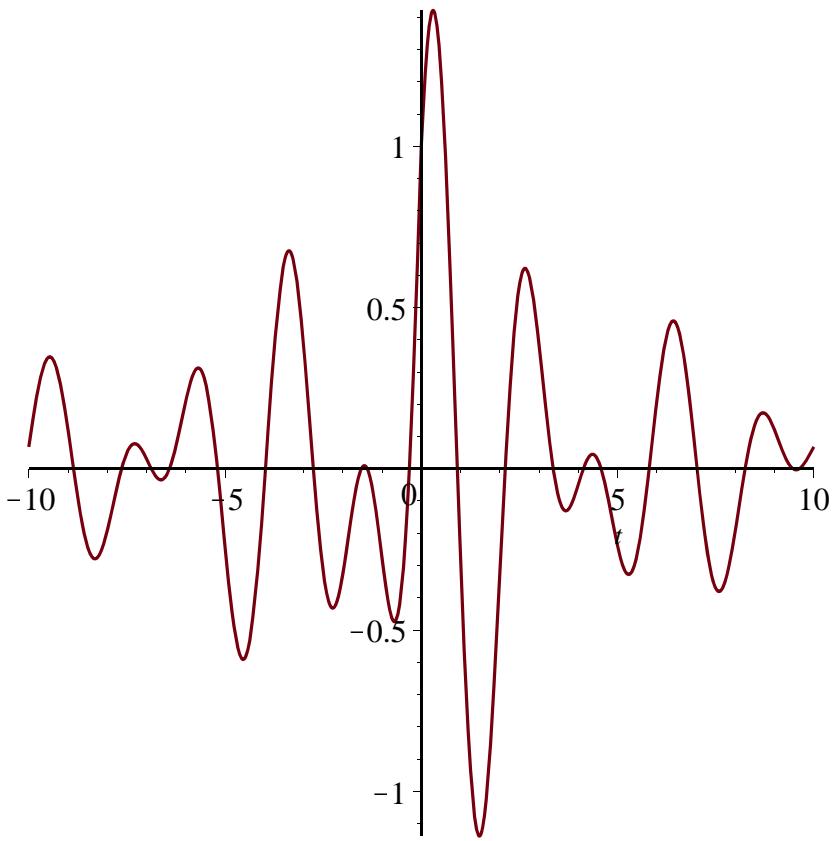
dess Fouriertransform $G = G(w)$ (som är komplexvärd)

```
>  G := fourier(g, t, w);
```

$G := -2.\,\mathrm{Ci}(2.\,w + 4.)\cos(w + 2.)^2 + 6.283185308\,\mathrm{signum}(w + 2.)\sin(2.\,w + 4.)$ **(5)**
$+ 6.283185308\,\mathrm{signum}(w - 2.)\sin(2.\,w - 4.) + \mathrm{Ci}(-2.\,w + 4.) + \mathrm{Ci}(2.\,w - 4.) + \mathrm{Ci}($
$-2.\,w - 4.) + \mathrm{Ci}(2.\,w + 4.) + 4.\,\mathrm{I}\,\mathrm{Si}(2.\,w - 6.283185308)\sin(w)\cos(w) + 2.\,\mathrm{I}\,\mathrm{Ci}(-2.\,w$
$+ 4.)\sin(w - 2.)\cos(w - 2.) - 2.\,\mathrm{I}\sin(w - 2.)\cos(w - 2.)\,\mathrm{Ci}(2.\,w - 4.) - 4.\,\mathrm{I}\,\mathrm{Si}(2.\,w$
$+ 6.283185308)\sin(w)\cos(w) + 2.\,\mathrm{I}\sin(w + 2.)\cos(w + 2.)\,\mathrm{Ci}(-2.\,w - 4.)$
$- 2.\,\mathrm{I}\sin(w + 2.)\cos(w + 2.)\,\mathrm{Ci}(2.\,w + 4.) - 6.283185308\,\mathrm{I}\,\mathrm{signum}(w$
$- 3.141592654)\sin(2.\,w) + 6.283185308\,\mathrm{I}\,\mathrm{signum}(w + 3.141592654)\sin(2.\,w)$
$+ 1.\,\mathrm{I}\,\mathrm{Ci}(-2.\,w - 6.283185308) + 1.\,\mathrm{I}\,\mathrm{Ci}(2.\,w + 6.283185308) - 1.\,\mathrm{I}\,\mathrm{Ci}(-2.\,w$
$+ 6.283185308) - 1.\,\mathrm{I}\,\mathrm{Ci}(2.\,w - 6.283185308) - 2.\,\mathrm{Ci}(-2.\,w + 4.)\cos(w - 2.)^2$
$- 2.\,\mathrm{Ci}(2.\,w - 4.)\cos(w - 2.)^2 - 2.\,\mathrm{Ci}(-2.\,w - 4.)\cos(w + 2.)^2$
$+ 3.141592654\,\mathrm{I}\cos(2.\,w + 4.) - 4.\,\mathrm{Si}(2.\,w + 4.)\sin(w + 2.)\cos(w + 2.) + 2.\,\mathrm{Ci}(-2.\,w$
$+ 6.283185308)\sin(w)\cos(w) - 2.\,\mathrm{Ci}(2.\,w - 6.283185308)\sin(w)\cos(w) - 2.\,\mathrm{Ci}($

$-2. w - 6.283185308) \sin(w) \cos(w) + 2. \, Ci(2. w + 6.283185308) \sin(w) \cos(w)$
$+ 2. \, I \, Ci(-2. w + 6.283185308) \cos(w)^2 + 2. \, I \, Ci(2. w - 6.283185308) \cos(w)^2$
$- 2. \, I \, Ci(-2. w - 6.283185308) \cos(w)^2 - 2. \, I \, Ci(2. w + 6.283185308) \cos(w)^2$
$+ 3.141592654 \, I \cos(2. w - 4.) - 4. \, Si(2. w - 4.) \sin(w - 2.) \cos(w - 2.)$

och dess spektrum $|G(w)|$

> $plot(\mathrm{abs}(G),\ w = -5 .. 5);$
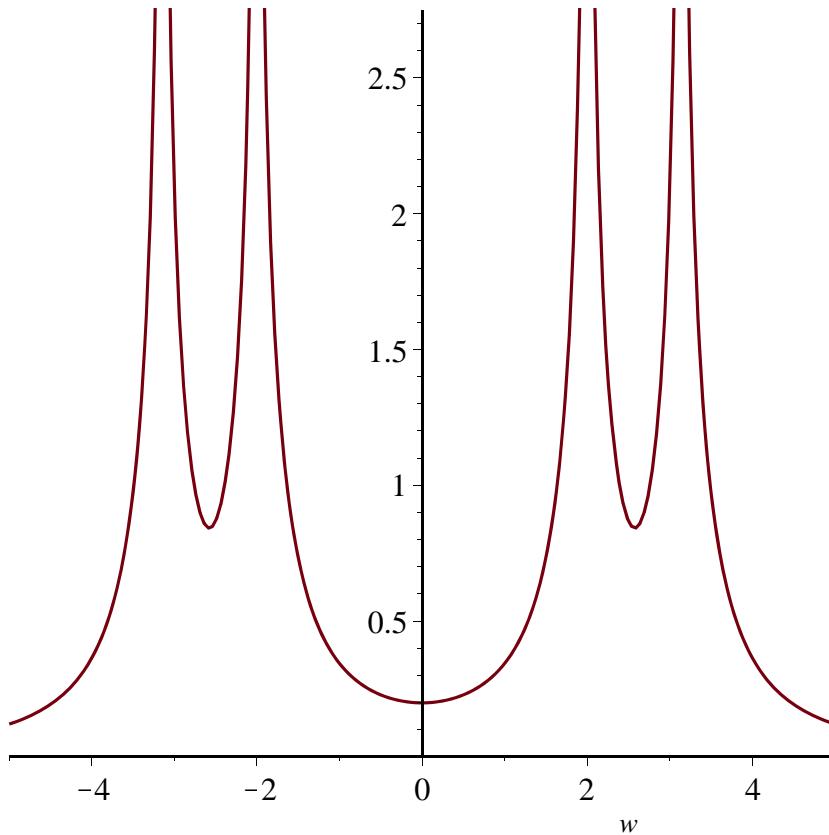
> $h := \dfrac{(\mathrm{Heaviside}(t + a) - \mathrm{Heaviside}(t - a))}{(2 \cdot a)}$

$$h := \frac{1}{2} \frac{\mathrm{Heaviside}(t + a) - \mathrm{Heaviside}(t - a)}{a} \tag{6}$$

> $H := fourier(h, t, w);$

$$H := \frac{\sin(a\, w)}{a\, w} \tag{7}$$

> $a := 5$

$$a := 5 \tag{8}$$

> $plot(h, t = -10 .. 10);$
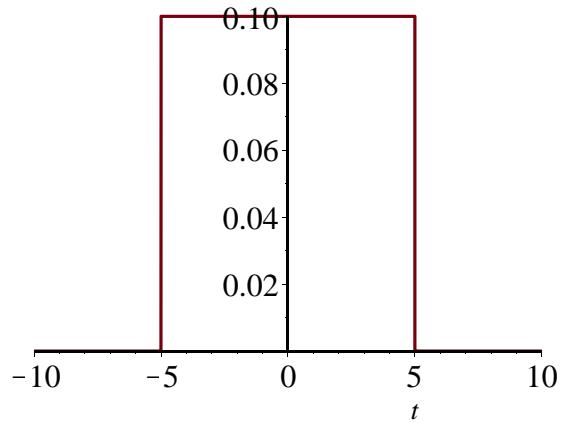
> $plot(H, w = -50 .. 50);$
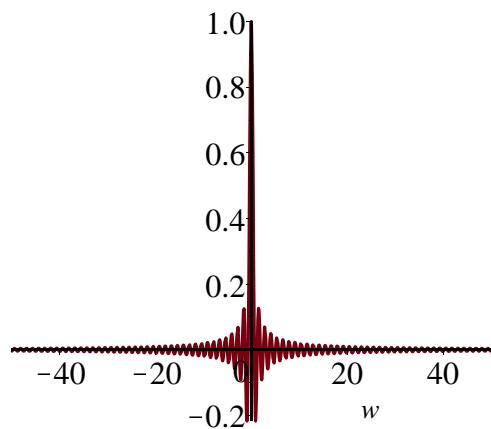
> $a := 1;$

$$a := 1 \tag{9}$$

> $plot(h, t = -10 .. 10);$
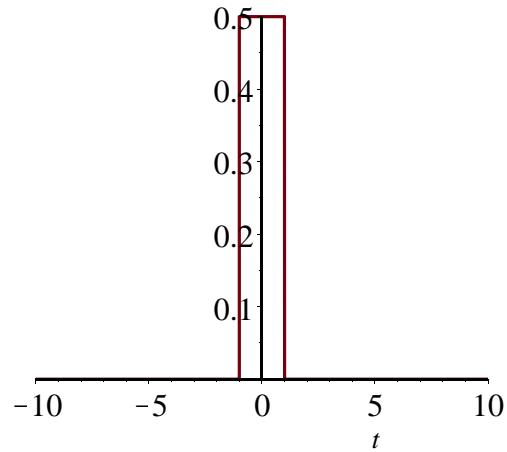
> $plot(H, w = -50 ..50);$
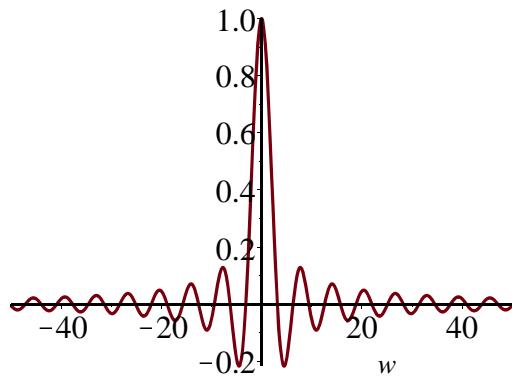
> $a := 0.5;$

$$a := 0.5$$ (10)

> $plot(h, t = -10 .. 10);$
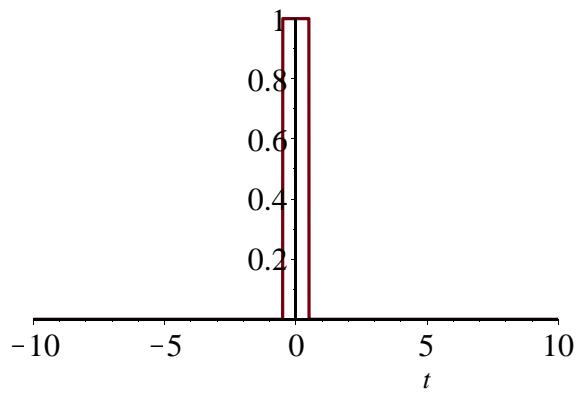
> $plot(H, w = -50 ..50);$
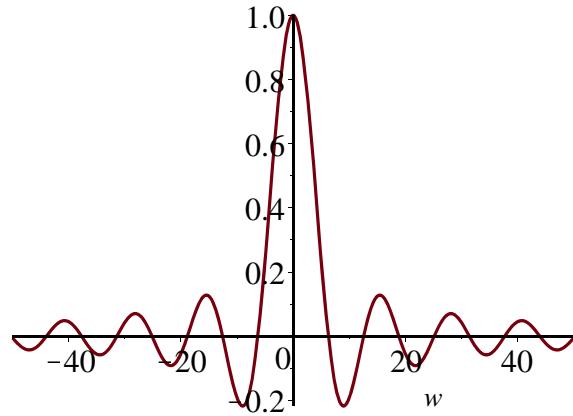
> $a := 0.1;$

$$a := 0.1 \tag{11}$$

> $plot(h, t = -10 .. 10);$

> $plot(H, w = -50 ..50);$

>