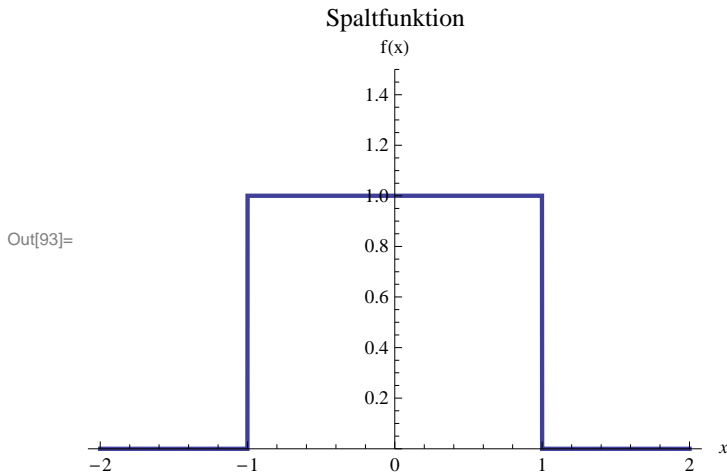


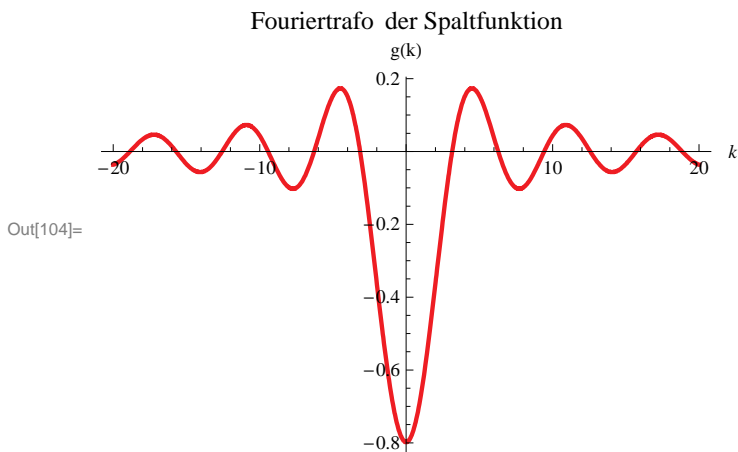
```
In[48]:= Integrate[1 / Sqrt[2 Pi] Exp[-I k x], {x, -1, 1}]
```

Out[48]=
$$\frac{\sqrt{\frac{2}{\pi}} \operatorname{Sin}[k]}{k}$$

```
In[93]:= Plot[HeavisideTheta[x + 1] - HeavisideTheta[x - 1], {x, -2, 2}, PlotStyle -> Thick, PlotRange -> {0, 1.5}, PlotLabel -> Spaltfunktion, AxesLabel -> {x, "f(x)"}]
```



```
In[104]:= Plot[-\frac{\sqrt{\frac{2}{\pi}} \operatorname{Sin}[k]}{k}, {k, -20, 20}, PlotStyle -> {Red, Thick}, PlotRange -> All, PlotLabel -> "Fouriertrafo der Spaltfunktion", AxesLabel -> {k, "g(k)"}]
```



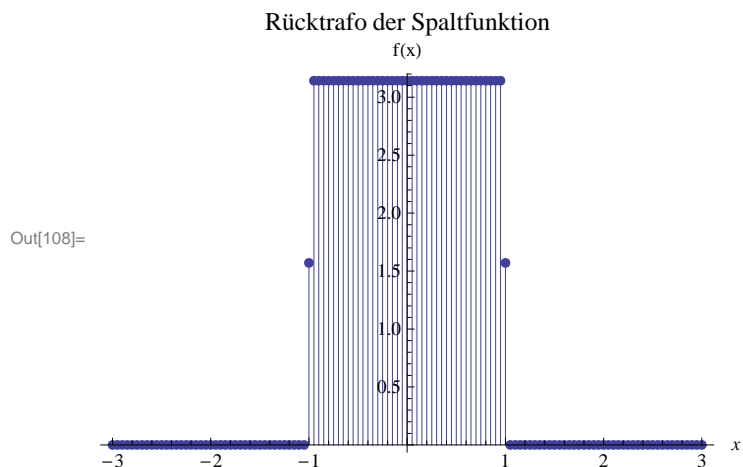
```
In[106]:= Integrate[Sin[k] / k Cos[k 1], {k, -\infty, \infty}]
```

Out[106]=
$$\frac{\pi}{2}$$

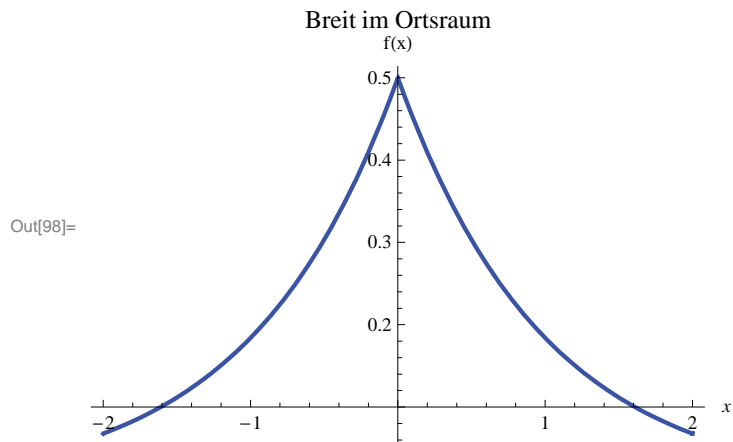
```
In[107]:= P = Table[{x, Integrate[Sin[k] / k Cos[k x], {k, -\infty, \infty}]}, {x, -3, 3, 0.05}];
```

Power::infy : Infinite expression $\frac{1}{0}$ encountered. >>

```
In[108]:= ListPlot[P, PlotStyle -> PointSize[Medium], Filling -> Axis,
  PlotLabel -> "Rücktrafo der Spaltfunktion", AxesLabel -> {x, "f(x)"}]
```



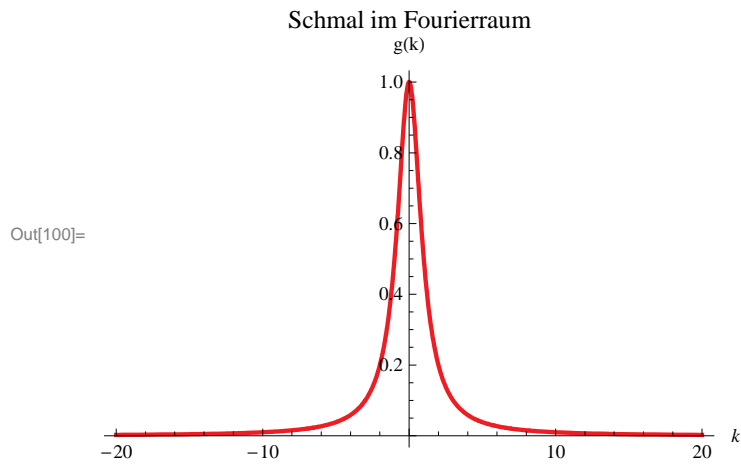
```
In[98]:= Plot[1 / (2 a) Exp[-a Abs[x]] /. a -> 1,
  {x, -2, 2}, PlotStyle -> {Blue, Thick}, PlotRange -> All,
  PlotLabel -> "Breit im Ortsraum", AxesLabel -> {x, "f(x)"}]
```



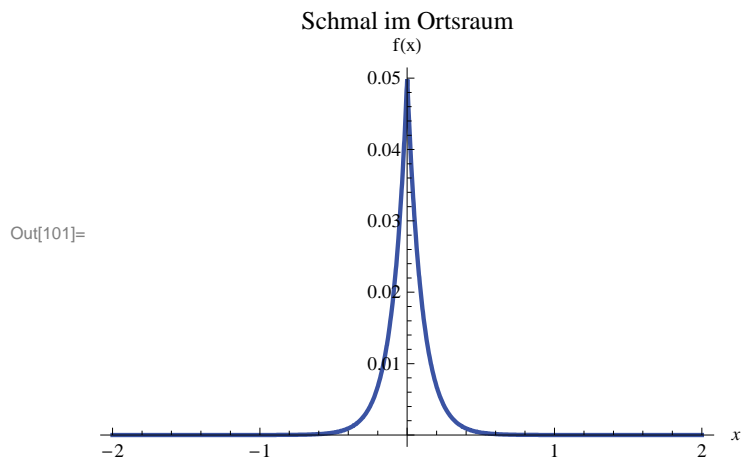
```
In[32]:= Simplify[Integrate[1 / (2 a) Exp[-a Abs[x]] Exp[-I k x],
  {x, -∞, ∞}, Assumptions -> {Im[k] == 0, Im[a] == 0, a > 0}]]
```

Out[32]= $\frac{1}{a^2 + k^2}$

```
In[100]:= Plot[ $\frac{1}{a^2 + k^2}$  /. a -> 1, {k, -20, 20}, PlotStyle -> {Thick, Red},
  PlotRange -> All, PlotLabel -> "Schmal im Fourierraum", AxesLabel -> {k, "g(k)"}]
```



```
In[101]:= Plot[1 / (2 a) Exp[-a Abs[x]] /. a -> 10, {x, -2, 2}, PlotStyle -> {Blue, Thick},
  PlotRange -> All, PlotLabel -> "Schmal im Ortsraum", AxesLabel -> {x, "f(x)"}]
```



```
In[102]:= Plot[ $\frac{1}{a^2 + k^2}$  /. a -> 10, {k, -20, 20}, PlotStyle -> {Thick, Red},
  PlotRange -> All, PlotLabel -> "Breit im Fourierraum", AxesLabel -> {k, "g(k)"}]
```

