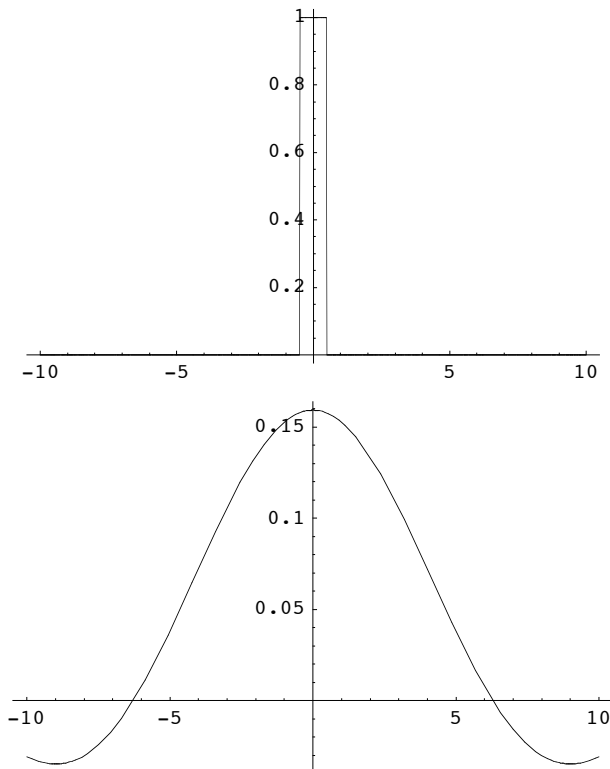


Square Wave

```
In[67]:= f[t_] =  $\frac{1}{T}$  (UnitStep[t +  $\frac{T}{2}$ ] - UnitStep[t -  $\frac{T}{2}$ ]);
g[ω_] = FourierTransform[f[t], t, ω, FourierParameters -> {-1, 1}] // FullSimplify
val = T -> 1;
Plot[f[t] /. val, {t, -10, 10}];
Plot[g[ω] /. val, {ω, -10, 10}];
```

```
Out[68]=  $\frac{e^{-\frac{1}{2} i T \omega} (\frac{i}{\pi \omega} + \text{DiracDelta}[\omega])}{2 T} - \frac{e^{\frac{i T \omega}{2}} (\frac{i}{\pi \omega} + \text{DiracDelta}[\omega])}{2 T}$ 
```

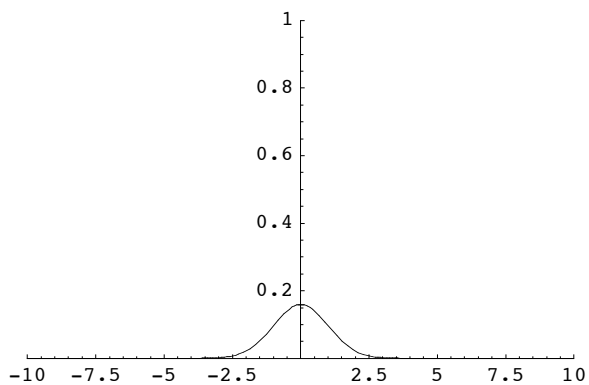
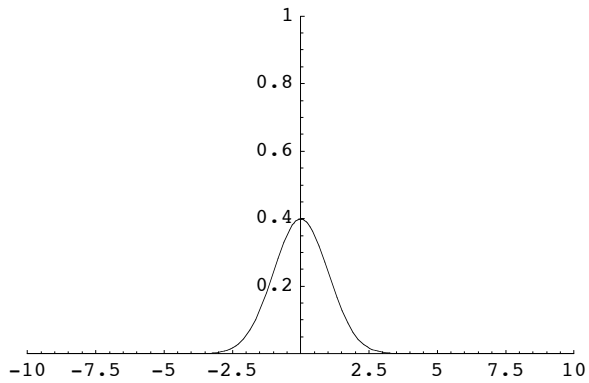


Gaussian

```
In[72]:= f[t_] =  $\frac{1}{\sqrt{2 \pi \tau}}$  e^{-\frac{t^2}{2 \tau^2}}
g[ω_] = FourierTransform[f[t], t, ω, FourierParameters -> {-1, 1}] // FullSimplify
val = τ -> 1;
Plot[f[t] /. val, {t, -10, 10}, PlotRange -> {{-10, 10}, {0, 1}}];
Plot[g[ω] /. val, {ω, -10, 10}, PlotRange -> {{-10, 10}, {0, 1}}];
```

```
Out[72]=  $\frac{e^{-\frac{t^2}{2 \tau^2}}}{\sqrt{2 \pi \tau}}$ 
```

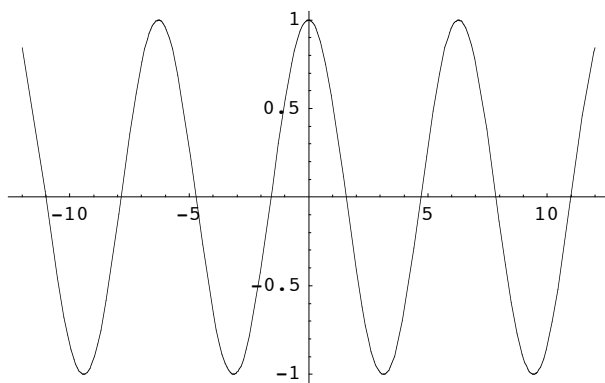
```
Out[73]=  $\frac{e^{-\frac{1}{2} \tau^2 \omega^2} \tau}{2 \pi \sqrt{\tau^2}}$ 
```



Cosine

```
In[77]:= f[t_] = Cos[t]
Plot[f[t], {t, -12, 12}];
g[ω_] = FourierTransform[f[t], t, ω, FourierParameters -> {-1, 1}]
```

```
Out[77]= Cos[t]
```

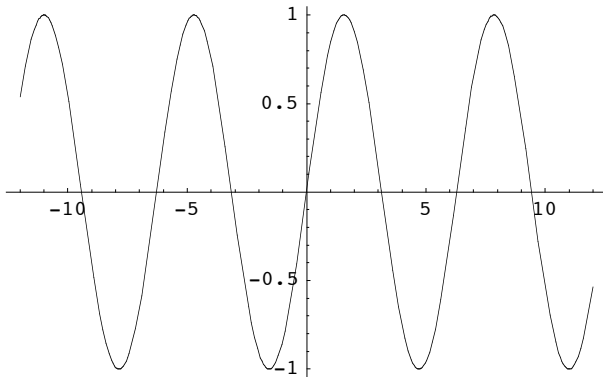


```
Out[79]=  $\frac{1}{2} \text{DiracDelta}[-1 + \omega] + \frac{1}{2} \text{DiracDelta}[1 + \omega]$ 
```

Sine

```
In[80]:= f[t_] = Sin[t]  
Plot[f[t], {t, -12, 12}];  
g[ω_] = FourierTransform[f[t], t, ω, FourierParameters -> {-1, 1}]
```

```
Out[80]= Sin[t]
```



```
Out[82]=  $\frac{1}{2} i \text{DiracDelta}[-1 + \omega] - \frac{1}{2} i \text{DiracDelta}[1 + \omega]$ 
```