In[1]:=
```
f[t_] := Piecewise[{{E^(-t+2πIt), t ≥ 0 && t ≤ 8}, {0, t < 0 && t > 8}}]
```

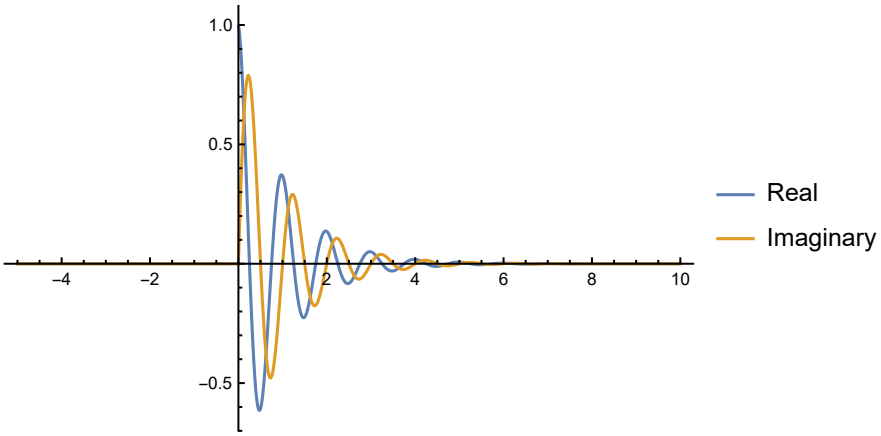
In[2]:=
```
h = {ComplexExpand[Re[f[t]]], ComplexExpand[Im[f[t]]]}
g = {ComplexExpand[Re[InverseFourierTransform[f[t], t, ω]]],
  ComplexExpand[Im[InverseFourierTransform[f[t], t, ω]]]}
```

Out[2]=
$$\left\{\mathrm{Re}\left[\begin{cases} e^{-t+2 i \pi t} & t \geq 0 \&\& t \leq 8 \\ 0 & \text{True} \end{cases}\right], \mathrm{Im}\left[\begin{cases} e^{-t+2 i \pi t} & t \geq 0 \&\& t \leq 8 \\ 0 & \text{True} \end{cases}\right]\right\}$$

Out[3]=
$$\left\{\frac{1}{\sqrt{2\pi}\left(1+(2\pi-\omega)^2\right)} - \frac{\cos[8\omega]}{e^8\sqrt{2\pi}\left(1+(2\pi-\omega)^2\right)} - \frac{\sqrt{2\pi}\sin[8\omega]}{e^8\left(1+(2\pi-\omega)^2\right)} + \frac{\omega\sin[8\omega]}{e^8\sqrt{2\pi}\left(1+(2\pi-\omega)^2\right)},\right.$$
$$\frac{\sqrt{2\pi}}{1+(2\pi-\omega)^2} - \frac{\omega}{\sqrt{2\pi}\left(1+(2\pi-\omega)^2\right)} - \frac{\sqrt{2\pi}\cos[8\omega]}{e^8\left(1+(2\pi-\omega)^2\right)} +$$
$$\left.\frac{\omega\cos[8\omega]}{e^8\sqrt{2\pi}\left(1+(2\pi-\omega)^2\right)} + \frac{\sin[8\omega]}{e^8\sqrt{2\pi}\left(1+(2\pi-\omega)^2\right)}\right\}$$

In[4]:=
```
Plot[h, {t, -5, 10}, PlotRange → All, PlotLegends → {"Real", "Imaginary"}]
Plot[g, {ω, 0, 10}, PlotRange → All, PlotLegends → {"Real", "Imaginary"}]
```

Out[4]=



Out[5]=