```
signals = {
    PDF[NormalDistribution[0, 1]] → "Gauss₁",
    PDF[NormalDistribution[0, 2]] → "Gauss₂",
    {0  #1 < 0
     1  #1 ≥ 0 & → "StepFunctionUp",
    {0  #1 > 0
     1  #1 ≤ 0 & → "StepFunctionDown"};
kernels = {DiracDelta → "DiracDelta",
    PDF[NormalDistribution[0, 0.1], #1] - PDF[NormalDistribution[0, 1], #1] & → "DoG"};
SetOptions[EvaluationNotebook[], ImageSizeMultipliers → {1, 1}];

(*Manipulate[
 Block[{conv,s,k},
  s[x_]:=signal[x];
  k[x_]:=kernel[x];
  conv=Convolve[s[x],k[x],x,y];

  Grid[{{
     Plot[{s[y],k[-y+a],s[y]*k[-y+a],{conv  y≤a
                                      Undefined  True},{y,-5,5},
      PlotRange→All,
      PlotLegends→{"Signal s","Kernel k","s · k","conv"},
      AxesLabel→{"x","*"},
      Filling→{3→Axis}],
     Plot[s[y],{y,-5,5},
      PlotRange→All,
      PlotLegends→{"Signal"},
      AxesLabel→{"x","s"}]
    },
    {Plot[k[y],{y,-5,5},
      PlotRange→All,
      PlotLegends→{"Kernel"},
      AxesLabel→{"x","k"}],
     Plot[conv,{y,-5,5},
      PlotRange→All,
      PlotLegends→{"s * k"},
      AxesLabel→{"x","s*k"}]
    }}]
 ]
 ,{a,-3,3},{signal,signals},{kernel,kernels}]*)

s[x_] := signals[[3, 1]][x];
k[x_] := kernels[[2, 1]][x];
conv = Convolve[s[x], k[x], x, y];
animateStep[a_] :=
  Plot[{s[y], k[-y + a], s[y] * k[-y + a], {conv  y ≤ a
                                            Undefined  True}, {y, -5, 5},
   PlotRange → {-0.6, 3.8},
   PlotLegends → {"Signal s[τ] = " <> ToString[Simplify[s[τ]], StandardForm],
     "Kernel k[-τ+t] = DoG0.1,1[-τ+t]", "s[τ] · k[-τ+t]", "(s * k)[t]"},
   AxesLabel → {"t,τ"},
   Filling → {3 → Axis},
   ImageSize → 422
  ];
```

```
Manipulate[
 animateStep[a]
 , {a, -3, 4}]
```


```
(*Export[FileNameJoin[{NotebookDirectory[],"frames/t=00.png"}],
  Table[animateStep[t],{t,-3,4,0.2}],"VideoFrames",Antialiasing→True];*)
```

```
conv // Simplify
```

$$1.11022 \times 10^{-16} + 0.5\,\text{Erf}[7.07107\,y] - 0.5\,\text{Erf}\left[\frac{y}{\sqrt{2}}\right]$$

$$\int_{-\text{Infinity}}^{\text{Infinity}} k[t]\,dt$$

$$-1.11022 \times 10^{-16}$$