In[1]:=
```
Remove["Global`*"]
```

Please see

http://www.sci.utah.edu/~gerig/CS7960-S2010/handouts/04%20Gaussian%20derivatives.pdf

and

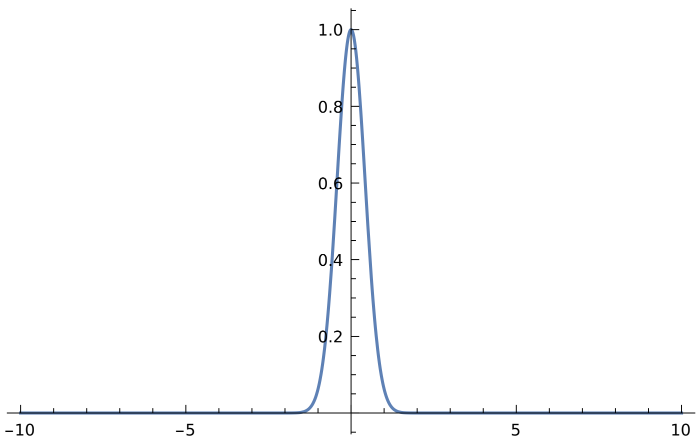
http://www.cse.yorku.ca/~kosta/CompVis_Notes/fourier_transform_Gaussian.pdf

In[3]:=
```
gaussian[x_, sigma_] := Exp[-x^2 / (2 * sigma^2)]
```

In[4]:=
```
normalizedGaussian [x_, sigma_] = Evaluate[gaussian[x, sigma] / gaussian[0, sigma]]
Plot[Evaluate[normalizedGaussian [x, 1.0 / 2.355]], {x, -10, 10}, PlotRange → All]
normalizedGaussian [0.5, 1.0 / 2.355]
```

Out[4]= $e^{-\frac{x^2}{2\,\text{sigma}^2}}$

Out[5]=



Out[6]= 0.499947

In[7]:=

In[8]:=
```
order = 1
```

```
gaussianderivative [x_, sigma_] := Evaluate[D[gaussian[x, sigma], {x, order}]]
maxValue[sigma_] := Solve[{Evaluate[D[gaussianderivative [x, sigma], {x, 1}]] == 0}, {x}]
normalizedGaussianDerivative [x_, sigma_] :=
 gaussianderivative [x, sigma]/(-gaussianderivative [x, sigma] /. maxValue[sigma][[1]])
```

```
Evaluate[Simplify[normalizedGaussianDerivative [x, sigma]]]
```

Out[8]= 1

Out[12]= $\frac{e^{\frac{1}{2}-\frac{x^2}{2\,\text{sigma}^2}}\,x}{\text{sigma}}$

Maxima of a gaussian derivative is
Solve[{Evaluate[D[gaussian[x,sigma],{x,2}]]==0},{x}],
in this case maximum is sigma.

Out[62]= {{x → -sigma}, {x → sigma}}

In[13]:=

In[14]:=
```
Plot[Evaluate[normalizedGaussianDerivative [x, 1.0 / 2.355]],
 {x, -10, 10}, PlotRange → All]
```

Out[14]=