In[6]:= $\frac{1}{\sqrt{2 \pi \sigma^2}} \int_{-2\sigma}^{2\sigma} e^{\left(-\frac{(x)^2}{2\sigma^2}\right)} dx$

Out[6]= $\frac{\sigma \, \mathrm{Erf}\left[\sqrt{2}\right]}{\sqrt{\sigma^2}}$

In[8]:= $\mathrm{Erf}\left[\sqrt{2}\right]$ // N

Out[8]= 0.9545

In[1]:= $\mathrm{Log}\left[\frac{1}{\sqrt{2 \pi \sigma^2}} e^{\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)}\right]$

Out[1]= $\mathrm{Log}\left[\frac{e^{-\frac{(x-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi} \sqrt{\sigma^2}}\right]$

In[2]:= $D\left[\mathrm{Log}\left[\frac{1}{\sqrt{2\pi}}\right] - \mathrm{Log}[\sigma] - \frac{(x-\mu)^2}{2\sigma^2}, \mu\right]$

$\frac{< x > - \mu}{\sigma^2}$

In[3]:= $D\left[\mathrm{Log}\left[\frac{1}{\sqrt{2\pi}}\right] - \frac{1}{2} \mathrm{Log}[\sigma 2] - \frac{(x-\mu)^2}{2\, \sigma 2}, \sigma 2\right]$

Out[3]= $\frac{(x-\mu)^2}{2\, \sigma 2^2} - \frac{1}{2\, \sigma 2}$

In[•]:= $\mathrm{FullSimplify}\left[\frac{(x-\mu)^2}{2\, \sigma 2^2} - \frac{1}{2\, \sigma 2}\right]$

$< (x-\mu)^2 > = \sigma 2$

In[4]:= $f[\mu\_, \sigma\_] := \frac{1}{\sqrt{2 \pi \sigma^2}} e^{\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)}$

In[5]:= $f[\mu 1, \sigma 1] \, f[\mu 2, \sigma 2]$

Out[5]= $\frac{e^{-\frac{(x-\mu 1)^2}{2\, \sigma 1^2} - \frac{(x-\mu 2)^2}{2\, \sigma 2^2}}}{2\pi \sqrt{\sigma 1^2} \sqrt{\sigma 2^2}}$

$-\frac{(x-\mu 1)^2}{2\, \sigma 1^2} - \frac{(x-\mu 2)^2}{2\, \sigma 2^2}$