Laplace :

In[262]:=
```
ClearAll[α, σ, μ, x]
```

```
p = 1 / (2 σ) Exp[-Abs[x - μ] / σ]
```

$$\frac{e^{-\frac{\text{Abs}[x-\mu]}{\sigma}}}{2\sigma}$$

```
θ = σ;
```

```
ss = FullSimplify[D[Log[p], θ]]
```

$$\frac{-\sigma + \text{Abs}[x-\mu]}{\sigma^2}$$

```
ss' = FullSimplify[D[ss, θ]]
```

$$\frac{\sigma - 2\,\text{Abs}[x-\mu]}{\sigma^3}$$

```
csIntCitatel1 = FullSimplify[p^(1 + α) * ss]
```

$$\frac{2^{-1-\alpha}\left(\frac{e^{-\frac{\text{Abs}[x-\mu]}{\sigma}}}{\sigma}\right)^{1+\alpha}(-\sigma + \text{Abs}[x-\mu])}{\sigma^2}$$

```
csIntCitatel2 = FullSimplify[csIntCitatel1 /. (x - μ) → y * σ, σ ≥ 0]
```

$$\frac{2^{-1-\alpha}\left(e^{\text{Abs}[y]}\,\sigma\right)^{-1-\alpha}(-1 + \text{Abs}[y])}{\sigma}$$

```
csIntCitatel3 = FullSimplify[Integrate[2 * csIntCitatel2 * σ, {y, 0, ∞}]]
```

$$\text{ConditionalExpression}\left[-\frac{2^{-\alpha}\,\alpha\,\sigma^{-1-\alpha}}{(1+\alpha)^2},\ \text{Re}[\alpha] > -1\right]$$

```
csIntJmenovatel1 = FullSimplify[p^(1 + α)]
```

$$2^{-1-\alpha}\left(\frac{e^{-\frac{\text{Abs}[x-\mu]}{\sigma}}}{\sigma}\right)^{1+\alpha}$$

```
csIntJmenovatel2 = FullSimplify[csIntJmenovatel1 /. (x - μ) → y * σ, σ ≥ 0]
```

$$2^{-1-\alpha}\left(e^{\text{Abs}[y]}\,\sigma\right)^{-1-\alpha}$$

```
csIntJmenovatel3 = FullSimplify[Integrate[2 * csIntJmenovatel2 * σ, {y, 0, ∞}]]
```

$$\text{ConditionalExpression}\left[\frac{2^{-\alpha}\,\sigma^{-\alpha}}{1+\alpha},\ \text{Re}[\alpha] > -1\right]$$

```
cs = FullSimplify[csIntCitatel3 / csIntJmenovatel3]
```

$$\text{ConditionalExpression}\left[-\frac{\alpha}{\sigma + \alpha\,\sigma},\ \text{Re}[\alpha] > -1\right]$$

```
cs' = FullSimplify[D[cs, θ]]
```

$$\text{ConditionalExpression}\left[\frac{\alpha}{(1+\alpha)\,\sigma^2},\ \text{Re}[\alpha] > -1\right]$$

```
Ia = FullSimplify[ (ss' - cs' - α (ss - cs) (cs - ss)) * p^(1 + α)]
```

$$\text{ConditionalExpression}\Big[\frac{1}{(1+\alpha)^2\,\sigma^4}\,2^{-1-\alpha}\left(\frac{e^{-\frac{\text{Abs}[x-\mu]}{\sigma}}}{\sigma}\right)^{1+\alpha}\big((1+2\,\alpha)\,\sigma^2+(1+\alpha)\,\text{Abs}[x-\mu]\,(-2\,(\sigma+2\,\alpha\,\sigma)+\alpha\,(1+\alpha)\,\text{Abs}[x-\mu])\big),\ \text{Re}[\alpha]>-1\Big]$$

```
Ia1 = FullSimplify[Ia /. (x - μ) → y * σ, σ ≥ 0]
```

$$\text{ConditionalExpression}\Big[\frac{1}{(1+\alpha)^2}\,2^{-1-\alpha}\,e^{-(1+\alpha)\,\text{Abs}[y]}\,\sigma^{-3-\alpha}\,\big(1+2\,\alpha-2\,(1+\alpha)\,(1+2\,\alpha)\,\text{Abs}[y]+y\,\alpha\,(1+\alpha)^2\,\text{Conjugate}[y]\big),\ \text{Re}[\alpha]>-1\Big]$$

```
Ia2 = FullSimplify[Integrate[2 * Ia1 * σ, {y, 0, ∞}]]
```

$$\text{ConditionalExpression}\Big[-\frac{2^{-\alpha}\,\sigma^{-2-\alpha}}{(1+\alpha)^3},\ \text{Re}[\alpha]>-1\Big]$$

```
IF = FullSimplify[-Ia2^(-1) * (p^α) * (ss - cs)]
```

$$\text{ConditionalExpression}\Big[(1+\alpha)^2\left(\frac{e^{-\frac{\text{Abs}[x-\mu]}{\sigma}}}{\sigma}\right)^{\alpha}\sigma^{\alpha}\,(-\sigma+(1+\alpha)\,\text{Abs}[x-\mu]),\ \text{Re}[\alpha]>-1\Big]$$

```
IF1 = FullSimplify[IF /. μ -> 0]
```

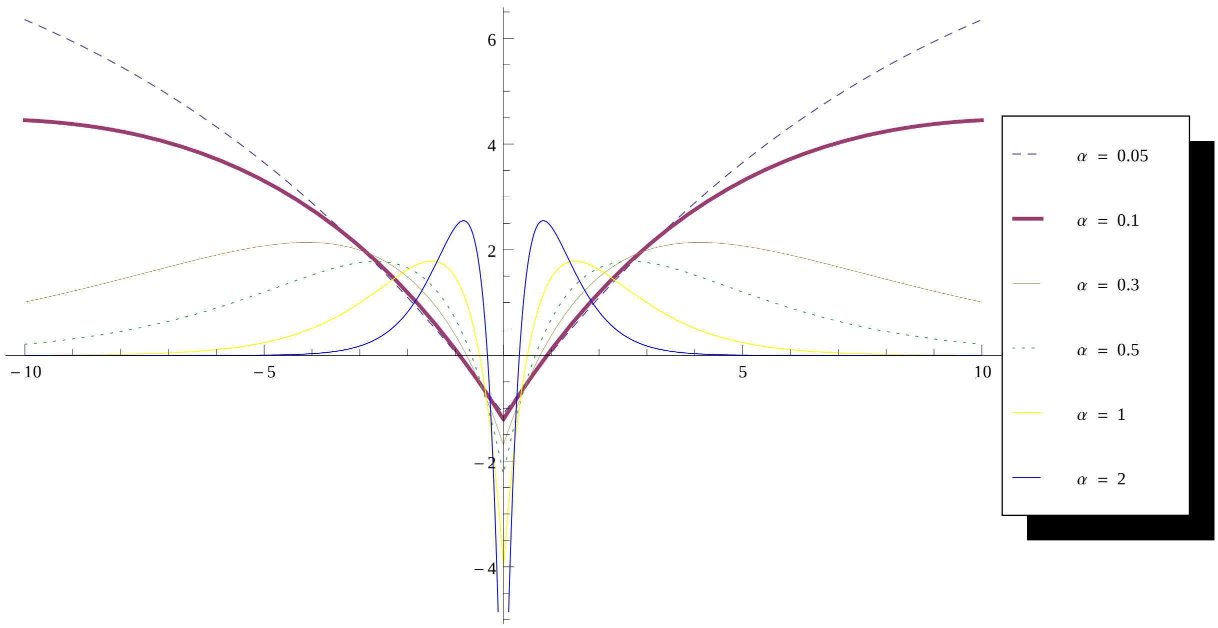
$$\text{ConditionalExpression}\Big[(1+\alpha)^2\left(\frac{e^{-\frac{\text{Abs}[x]}{\sigma}}}{\sigma}\right)^{\alpha}\sigma^{\alpha}\,(-\sigma+(1+\alpha)\,\text{Abs}[x]),\ \text{Re}[\alpha]>-1\Big]$$

In[259]:=
$$\textbf{IFun} = \textbf{Function}\Big[\{\sigma,\alpha\},\ (1+\alpha)^2\left(\frac{e^{-\frac{\text{Abs}[x]}{\sigma}}}{\sigma}\right)^{\alpha}\sigma^{\alpha}\,(-\sigma+(1+\alpha)\,\text{Abs}[x])\Big];$$

```
Needs["PlotLegends`"]
```

In[260]:=
```
Plot[{
  IFun[1, 0.05],
  IFun[1, 0.1],
  IFun[1, 0.3],
  IFun[1, 0.5],
  IFun[1, 1],
  IFun[1, 2]},
 {x, -10, 10},
 PlotLegend → {"α = 0.05", "α = 0.1", "α = 0.3", "α = 0.5", "α = 1", "α = 2"},
 LegendPosition → {1, -0.4},
 PlotStyle → {Dashed, Thick, Thin, Dotted, Yellow, Blue}
]
```

Out[260]=



Normalni :

```
ClearAll[α, σ, μ, x]
```

```
θ = μ
```

μ

```
ss = FullSimplify[D[Log[p], θ]]
```

$$\frac{\text{Abs}'[x-\mu]}{\sigma}$$

```
ss' = FullSimplify[D[ss, θ]]
```

$$-\frac{\text{Abs}''[x-\mu]}{\sigma}$$

```
csIntCitatel1 = FullSimplify[p^(1 + α) * ss]
```

$$\frac{2^{-1-\alpha}\left(\frac{e^{-\frac{\text{Abs}[x-\mu]}{\sigma}}}{\sigma}\right)^{1+\alpha}\text{Abs}'[x-\mu]}{\sigma}$$

```
csIntCitatel2 = FullSimplify[csIntCitatel1 /. (x - μ) → y * σ, {σ ≥ 0, y ≥ 0}]
```

$$2^{-1-\alpha}\, e^{-y\,(1+\alpha)}\, \sigma^{-2-\alpha}\,\text{Sign}[y]\,\text{Sign}[\sigma]$$

```
csIntCitatel3 = FullSimplify[Integrate[2 * csIntCitatel2 * σ, {y, 0, ∞}]]
```

$$\text{ConditionalExpression}\left[\frac{2^{-\alpha}\,\sigma^{-1-\alpha}\,\text{Sign}[\sigma]}{1+\alpha},\ \text{Re}[\alpha] > -1\right]$$

```
csIntJmenovatel1 = FullSimplify[p^(1 + α)]
```

$$2^{-1-\alpha}\left(\frac{e^{-\frac{\text{Abs}[x-\mu]}{\sigma}}}{\sigma}\right)^{1+\alpha}$$

```
csIntJmenovatel2 = FullSimplify[csIntJmenovatel1 /. (x - μ) → y * σ, {σ ≥ 0, y ≥ 0}]
```

$$2^{-1-\alpha}\,(e^{y}\,\sigma)^{-1-\alpha}$$

```
csIntJmenovatel3 = FullSimplify[Integrate[csIntJmenovatel2 * σ * 2, {y, 0, ∞}]]
```

$$\text{ConditionalExpression}\left[\frac{2^{-\alpha}\,\sigma^{-\alpha}}{1+\alpha},\ \text{Re}[\alpha] > -1\right]$$

```
cs = FullSimplify[csIntCitatel3 / csIntJmenovatel3]
```

$$\text{ConditionalExpression}\left[\frac{\text{Sign}[\sigma]}{\sigma},\ \text{Re}[\alpha] > -1\right]$$

```
cs' = FullSimplify[D[cs, θ]]
```

0

```
Ia = FullSimplify[ (ss' - cs' - α (ss - cs) (cs - ss)) * p^(1 + α)]
```

$$\text{ConditionalExpression}\left[\frac{2^{-1-\alpha}\left(\frac{e^{\frac{-x+\mu}{\sigma}\text{Sign}[x-\mu]}}{\sigma}\right)^{1+\alpha}\left(\alpha\,(\text{Sign}[\sigma]-\text{Abs}'[x-\mu])^{2}-\sigma\,\text{Abs}''[x-\mu]\right)}{\sigma^{2}},\ \text{Re}[\alpha] > -1\right]$$

```
Ia1 = FullSimplify[Ia /. (x - μ) → y * σ, {σ ≥ 0}]
```

$$\text{ConditionalExpression}\left[\frac{2^{-1-\alpha}\left(\frac{e^{\frac{-x+\mu}{\sigma}\text{Sign}[y]}}{\sigma}\right)^{1+\alpha}\left(\alpha\,(\text{Sign}[\sigma]-\text{Abs}'[y\,\sigma])^{2}-\sigma\,\text{Abs}''[y\,\sigma]\right)}{\sigma^{2}},\ \text{Re}[\alpha] > -1\right]$$

```
Ia2 = FullSimplify[Ia1 /. (-x + μ) → -y * σ, {σ > 0, y > 0}]
```

$$\text{ConditionalExpression}\left[-2^{-1-\alpha}\,e^{y}\,(e^{y}\,\sigma)^{-2-\alpha}\,\text{Abs}''[y\,\sigma],\ \text{Re}[\alpha] > -1\right]$$

```
Ia2 = FullSimplify[Integrate[Ia1 * σ * 2, {y, 0, ∞}]]
```

Integrate::idiv : Integral of $\alpha\left(\text{Sign}[\sigma]-\text{Abs}'[y\,\sigma]\right)^{2}-\sigma\,\text{Abs}''[y\,\sigma]$ does not converge on $\{0, \infty\}$. ≫

$$\int_0^{\infty}\text{ConditionalExpression}\left[\frac{2^{-\alpha}\left(\frac{e^{\frac{-x+\mu}{\sigma}\text{Sign}[y]}}{\sigma}\right)^{1+\alpha}\left(\alpha\,(\text{Sign}[\sigma]-\text{Abs}'[y\,\sigma])^{2}-\sigma\,\text{Abs}''[y\,\sigma]\right)}{\sigma},\ \text{Re}[\alpha] > -1\right]dy$$

```
IF = FullSimplify[-Ia2^(-1) * (p^α) * (ss - cs)]
```

$$\text{ConditionalExpression}\left[(1+\alpha)^{3/2}\,(x-\mu)\,\sigma\,\left(\sigma^2\right)^{\frac{1}{2}(-1+\alpha)}\left(\frac{e^{-\frac{(x-\mu)^2}{2\sigma^2}}}{\sqrt{\sigma^2}}\right)^{\alpha},\ \text{Re}[\alpha]>-1\right]$$

```
IF1 = FullSimplify[IF /. σ → 1]
```

$$\text{ConditionalExpression}\left[\left(e^{-\frac{1}{2}(x-\mu)^2}\right)^{\alpha}(1+\alpha)^{3/2}(x-\mu),\ \text{Re}[\alpha]>-1\right]$$

In[263]:= $\textbf{IFun = Function}\left[\{\mu,\alpha\},\ \left(e^{-\frac{1}{2}(x-\mu)^2}\right)^{\alpha}(1+\alpha)^{3/2}(x-\mu)\right];$

```
Needs["PlotLegends`"]
```

In[264]:=
```
Plot[{
  IFun[0, 0.05],
  IFun[0, 0.1],
  IFun[0, 0.3],
  IFun[0, 0.5],
  IFun[0, 1],
  IFun[0, 2]},
 {x, -10, 10},
 PlotLegend → {"α = 0.05", "α = 0.1", "α = 0.3", "α = 0.5", "α = 1", "α = 2"},
 LegendPosition → {1, -0.4},
 PlotStyle → {Dashed, Thick, Thin, Dotted, Yellow, Blue}
]
```

Out[264]=