In[13]:=
```
SetOptions[$FrontEndSession, FontProperties → {"ScreenResolution" → Automatic}]
```

Counter example: The heat equation (parabolic problem)

$\partial_t T = \kappa\, \partial_{yy} T$

A solution to boundary condition and initial condition $T(t_0, y_0) = T(0, 0) = T_s$, $T(0, y) = T_0$ is

$T = T_0 + (T_s - T_0)\, \mathrm{erfc}\left[\frac{y}{2\sqrt{\kappa t}}\right]$

Notice that the diff equation "is linear" in κ. Notice also that the temperature "field" resembles a normal-mode problem; it's homogeneous, and the constants T_s and T_0 in the solution depend only on the initial conditions. We can easily show that the solution is not linear in κ. May be the solution is linear in log κ ? Judge yourself!

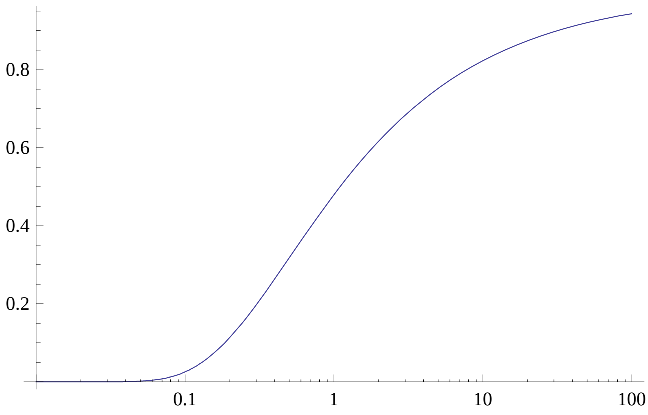
The visco-elastic diff equation has second and higher order spatial derivatives while it is of first order w.r.t. time. The laterally inhomogeneous problem has space-dependent coefficients in the system matrix in 3-d. My example exhibits nonlinear dependence on the single (and constant w,r,t, *t* and *y*) parameter already in this - you could say - trivial case. It's not trivial at all, and any proposal that it would disregard basic properties of linear differential equations.

In[2]:= $\partial_x \mathrm{Erfc}\left[\frac{y}{2\sqrt{x\, t}}\right]$

Out[2]= $\frac{e^{-\frac{y^2}{4 t x}}\, t\, y}{2\sqrt{\pi}\,(t\, x)^{3/2}}$

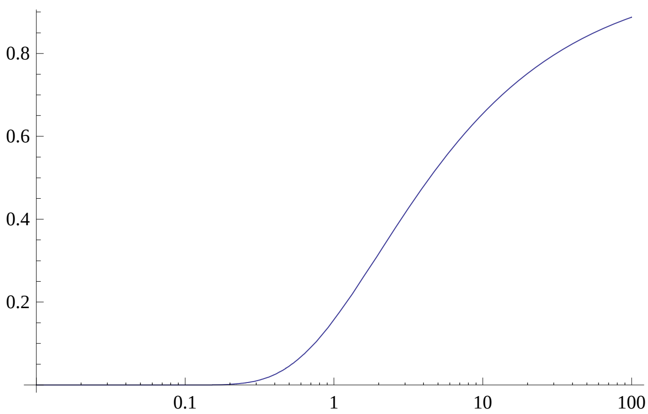
In[15]:= $\mathrm{LogLinearPlot}\left[\mathrm{Erfc}\left[\frac{1}{2\sqrt{x}}\right], \{x, 0.01, 100\}\right]$

Out[15]=



In[14]:= $\mathrm{LogLinearPlot}\left[\mathrm{Erfc}\left[\frac{2}{2\sqrt{x}}\right], \{x, 0.01, 100\}\right]$

Out[14]=



In[16]:=
```
LogLinearPlot[Erfc[0.5/(2 Sqrt[x])], {x, 0.01, 100}]
```

Out[16]=