SciML: Day 1

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Poisson equation 1D

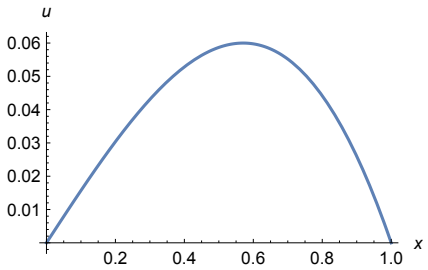
The analytical solution of the proposed PDE in the Jupyter notebook poisson.ipynb looks like this

In[ ]:=
```
Clear[u,x]
(*Solve analitically the PDE, actually an ODE for this 1D case*)
FullSimplify[DSolve[{-u''[x] == Sin[x],u[0]==0,u[1]==0}, u[x], x]]
```

Out[ ]= $\{\{u[x] \to -x\,\text{Sin}[1] + \text{Sin}[x]\}\}$

In[ ]:=
```
(*Define the solution*)
u[x_]:=-x*Sin[1]+Sin[x]
(*Plot the solution*)
Plot[u[x],{x,0,1},AxesLabel→{x,u}]
```

Out[ ]=



Laplace equation 2D

```
(* Specify the PDE *)
pde = ∇²{x,y}u[x,y] == 0;
(* Specify the Boundary Conditions *)
bc = DirichletCondition[u[x,y] == Sin[x*y], True];
(*Solve it !*)
NDSolveValue[{pde, bc}, u, {x,y} ∈ Disk[]]
```

Out[ ]= InterpolatingFunction[Domain: {{−1., 1. }, {−1., 1. }} Output: scalar]

In[ ]:=
```
ContourPlot[%[x, y], {x, y} ∈ Disk[]]
```

Out[ ]=