L1

Laplace Eqn

Diffusion eqn $p(x,t)$ Density, temperature

$$\partial p/\partial t = D\,\partial^2 p/\partial x^2$$

Laplace eqn $u(x,y)$ Electric potential

$$\frac{\partial^2 u(x,y)}{\partial x^2} + \frac{\partial^2 u(x,y)}{\partial y^2} = 0$$

As before ...

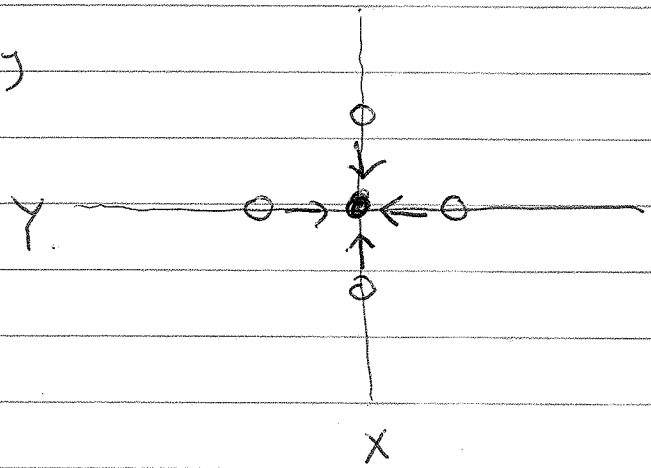
$$\frac{u(x+dx,y) - 2u(x,y) + u(x-dx,y)}{dx^2}$$

$$+ \frac{u(x,y+dy) - 2u(x,y) + u(x,y-dy)}{dy^2} = 0$$

Choose $dx = dy$

$$u(x,y) = \frac{1}{4}\left[u(x+dx,y) + u(x-dx,y) + u(x,y+dy) + u(x,y-dy)\right]$$

Pictorially



replace ◉ by average of four surrounding values ○

A-1

Two dimensional arrays

rho[1000] → rho[0], rho[1], .. rho[999]

rho[100][100] → rho[0][99] rho[1][99] rho[99][99]

10^4 variables at once!

rho[0][1] rho[1][1] .. rho[99][1]
rho[0][0] rho[1][0] .. rho[99][0]

Can of course store as 1-d array but more confusing

rho[9999]

rho[100] rho[101] .. rho[199]
rho[0] rho[1] .. rho[99]