4) Given

$$\frac{\partial P(x,y,t)}{\partial t} = D_x \frac{\partial^2 P(x,y,t)}{\partial x^2} + D_y \frac{\partial^2 P(x,y,t)}{\partial y^2}$$

$-L \le y \le L$; $-L \le x \le L$; $0 \le t \le T$

Initial conditions : $P(x,y,0) = 1$ for $x=0$ and $y=0$
$= 0$ otherwise

Boundary conditions : $P(-L,y,t) = 0$ all y,t
$P(L,y,t) = 0$ all y,t
$P(x,-L,t) = 0$ all x,t
$P(x,L,t) = 0$ all x,t.

Forward euler scheme:

$t = n\Delta t$, $n \in 0,1,2 \ldots N_t$

$$P(i,j,n+1) = P(i,j,n) + \frac{D\Delta t}{(\Delta x)^2}\Big[P(i+1,j,n) - 2P(i,j,n) + P(i-1,j,n)\Big] + \frac{D\Delta t}{(\Delta y)^2}\Big[P(i,j+1,n) - 2P(i,j,n) + P(i,j-1,n)\Big]$$