```
function wk3_1a_romain

% 1D random walk with logistic birth week3 mathbio

N_individuals = 100; %number of individuals
dx = 0.01; %hop distance
dt = 0.01; %Hop time

x_max = 5; %upper boundary
x_min = -5; %lower boundary
x_nodes = x_min:dx:x_max; %positions of nodes
N_nodes = length(x_nodes); %Number of nodes

r_repro = 0.1; %reproduction rate
K = N_individuals/length(-0.1:dx:0.1); %Carrying capacity per blob

T_max = 10;
num_time = T_max/dt; % timesteps
a = -0.1;
b = 1;
x = a+(b-a).*rand(1,N_individuals); %starting position between a and b

close all
figure,
pause;
for i = 1:num_time %Loop over timestep

    for j = 1:N_individuals %loop individuals

        B = rand(1);

        if B <=0.6 % biased walk to test the boundary set up

            x(j) = x(j) - dx;

        else

            x(j) = x(j) + dx;

        end

        if x(j) > x_max %periodic boundary x = x_max

            x(j) = x(j)*0 - -5;

        elseif x(j) < x_min %periodic boundary x = x_min

            x(j) = x(j)*0 + 5;

        end

    end
```

```
x_births = [];
for k = 1:N_nodes-2
    num_individuals = sum(x == x_nodes(k)); %summing over the
individuals

%     advec = (num_individuals(k+1) - num_individuals(k))/dx; I tried
to
%     add the advection term but I don't think this is the right way
to do
%     it

    births(k) =  round( r_repro*num_individuals*(1-
num_individuals/K)); %logistic birth with r = 0.1 ok

    if births(k) > 0

       births_vec = ones(1,births(k));

       x_births = [x_births,births_vec*x_nodes(k)];

    end
end


 y=linspace(0,1,N_individuals); %define Y to plot against X
 x = [x,x_births];
 N_individuals = length(x);

 scatter(x,y)
 set(gca,'xlim',[-6,6])
 drawnow
end
```