Q1. To plot a graph x(t) vs y(t), time Vs x(t),y(t) in Lotka volterra model.

Script:

```
function ddt = locta(t,x)
x0 = x(1)
y0 = x(2)
ddt = zeros(2,1)
a = 1.0
b = 1.0
d = 1.0
g = 1.0
ddt(1) = a*x0-b*x0*y0
ddt(2) = d*x0*y0-g*y0
```

Command window:

initial = [1; 2];
tspan = [0 100];
[t n] = ode45(@locta,tspan,initial);

For 'time' Vs 'x(t),y(t)':

plot (t,n),xlabel('time'),ylabel('x(t),y(t)'),legend('x(t)','y(t)');

For 'x(t)' Vs 'y(t)':

plot (n(:,1),n(:,2)),xlabel('x(t)'),ylabel('y(t)');

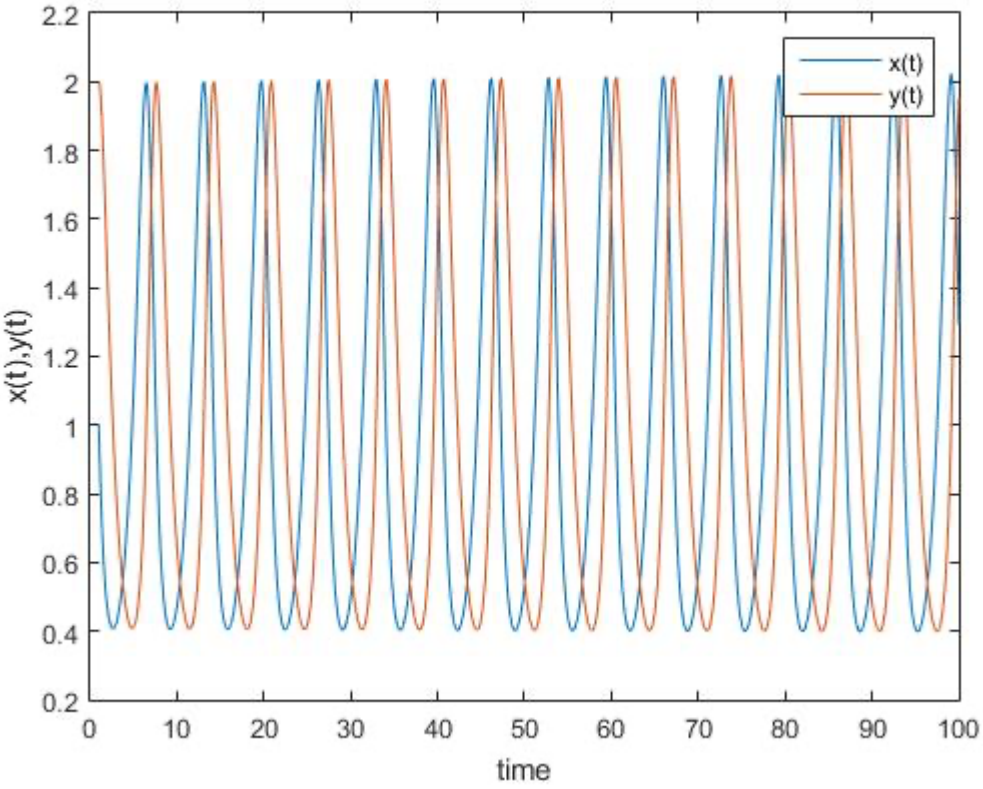
For 't' Vs 'x(t)':

plot(t,n(:,1)),xlabel('t'),ylabel('x(t)');

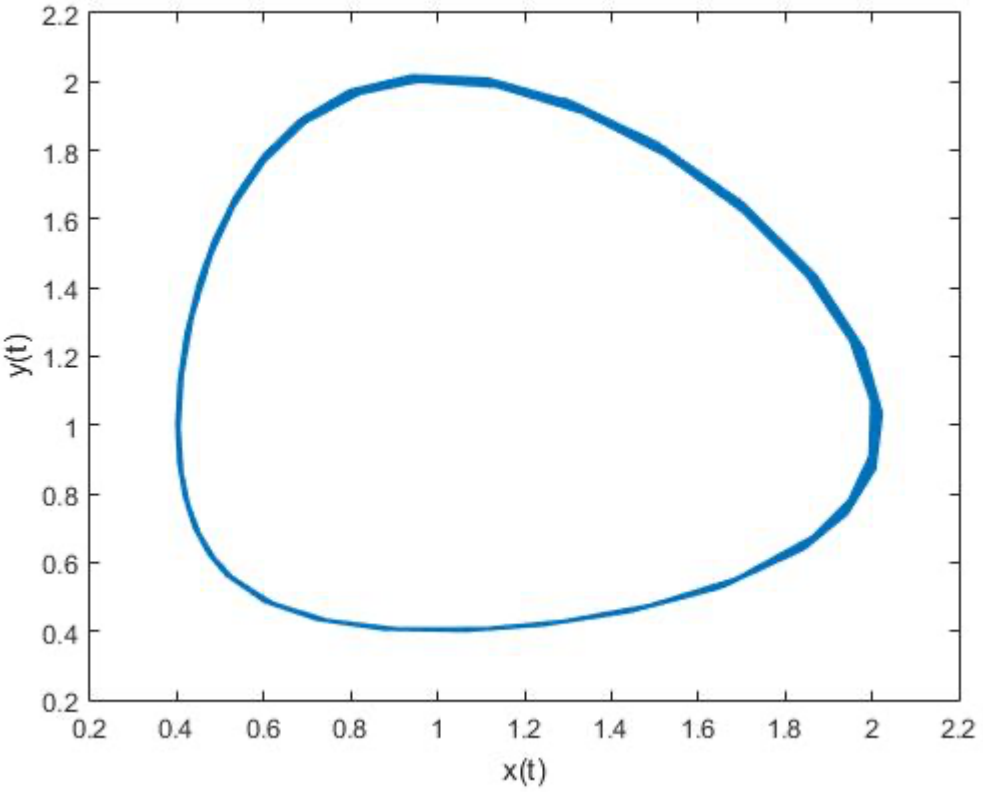
For 't' Vs 'y(t)':

plot(t,n(:,2)),xlabel('t'),ylabel('y(t)');

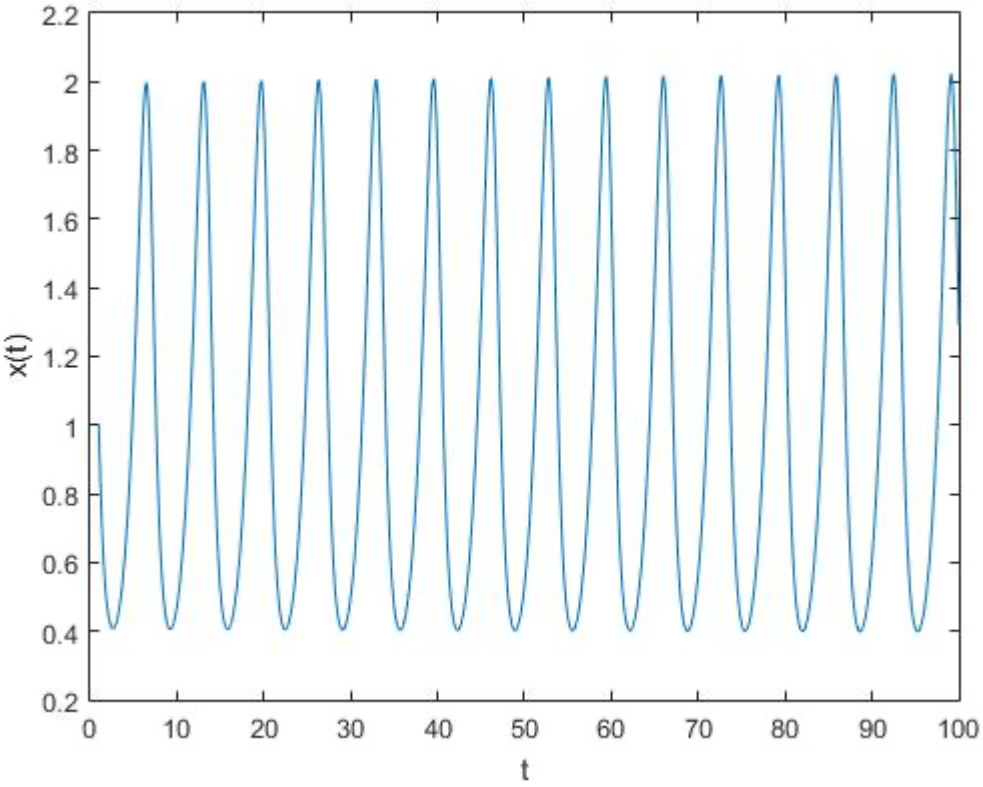
For ‘time’ Vs ‘x(t),y(t)’:



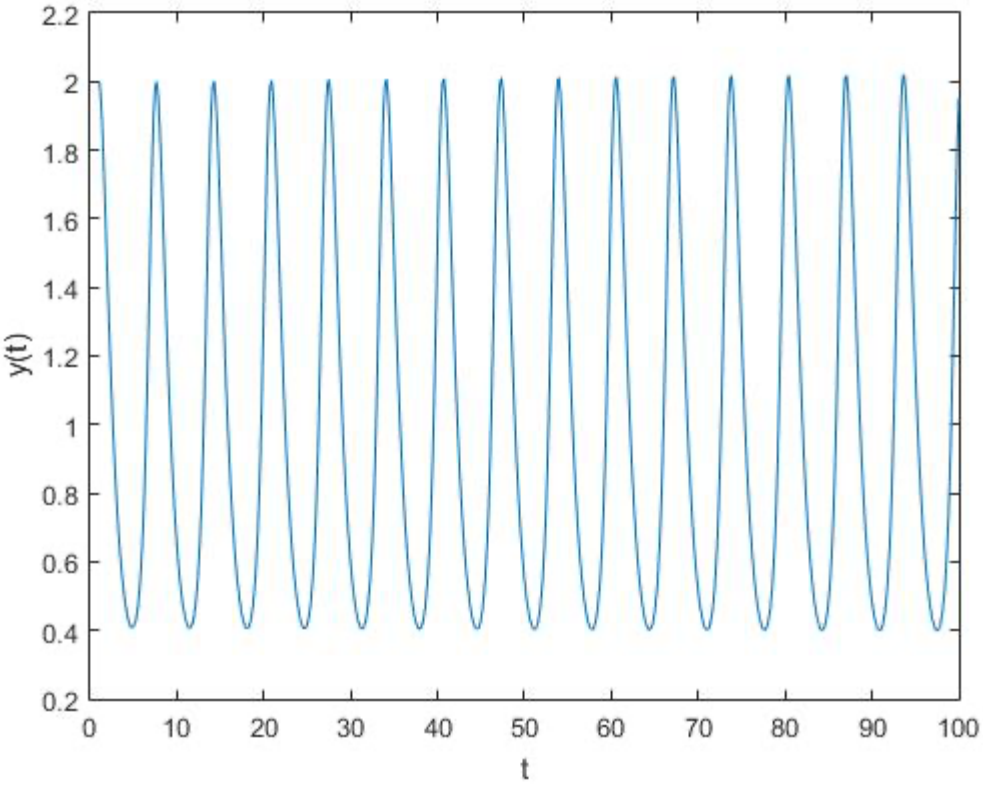
For ‘x(t)’ Vs ‘y(t)’:



For ‘t’ Vs ‘x(t)’:

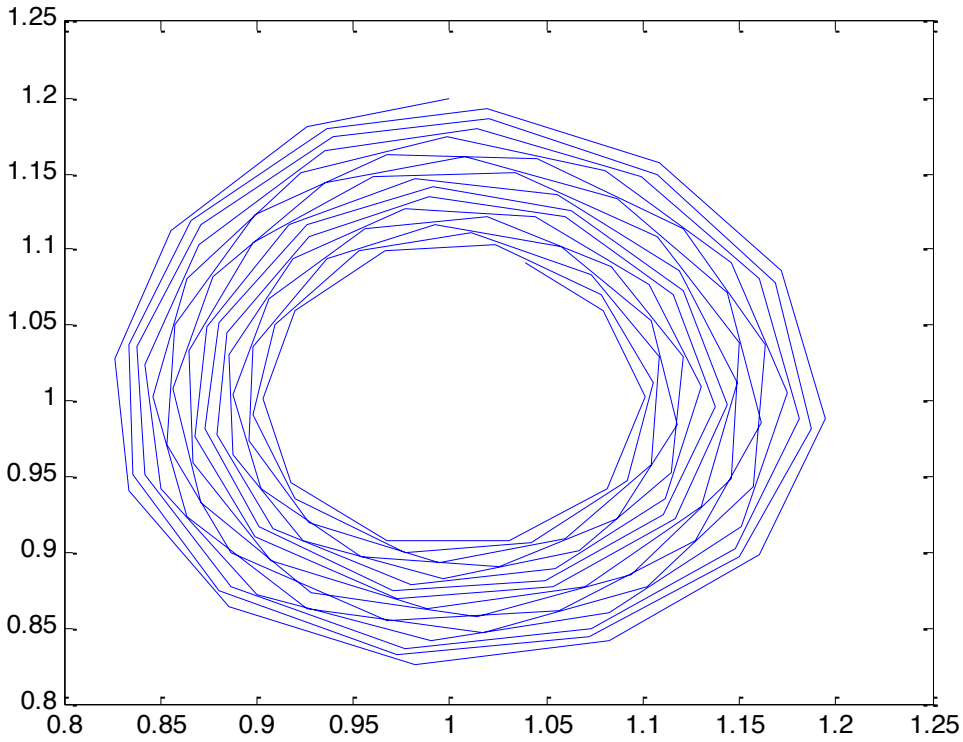


For ‘t’ Vs ‘y(t)’:



Or

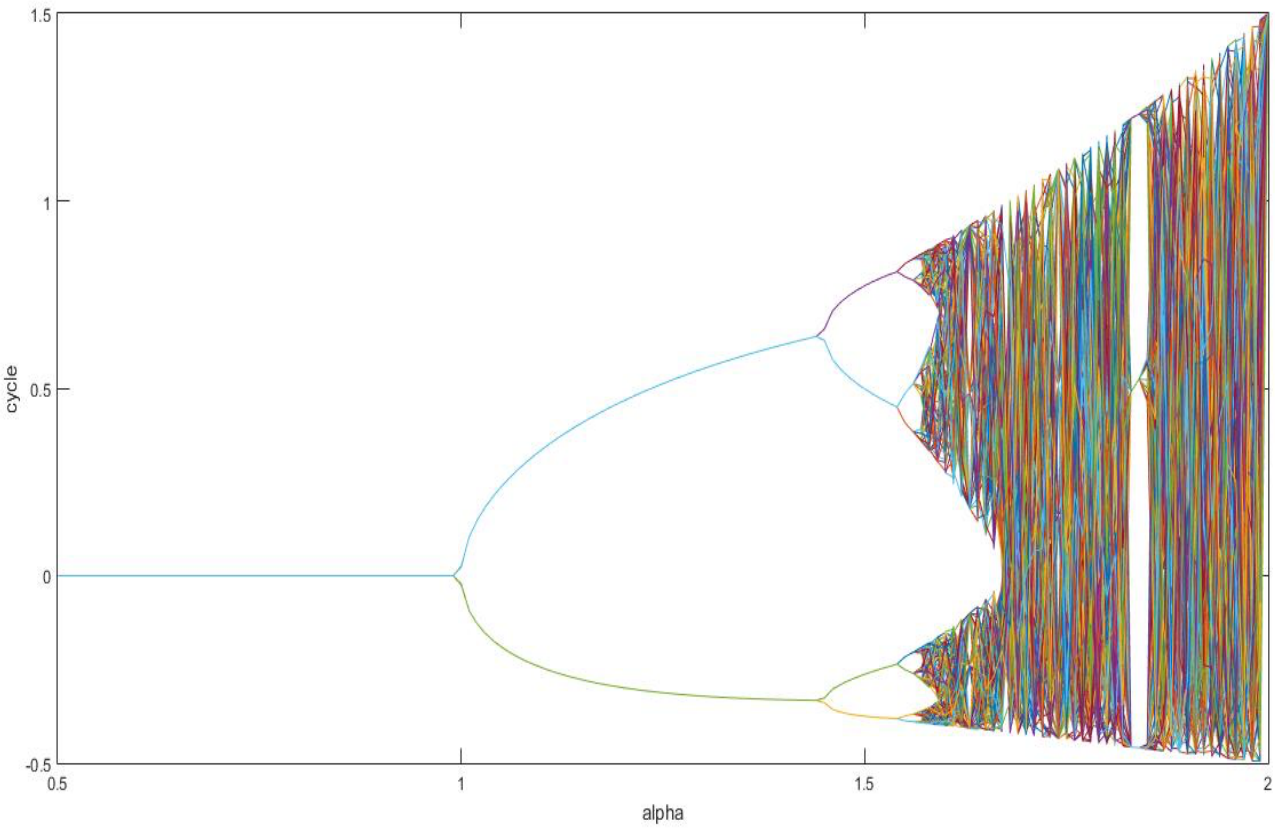
```
function drdt=f3(t,r)
alpha=1.0
beta=1.0
gama=1.0
delta=1.0
drdt(1,1)=(alpha*r(1))-(beta*r(1)*r(2))
drdt(2,1)=(gama*r(1)*r(2))-(delta*r(2))

condition:
[t1,r1]=ode23(@jacobian,[0 100],[1;1.2])
```



Q2. Bifurcation diagram for logistic map.

Script:

```
solutionInterval = 1:1000;
rRange = 0.5:0.01:4;
x = 0.5* ones (1, length ( rRange ));
index = 1;
for r = rRange ;
for n = solutionInterval ;
x(n+1, index ) = -r*x(n, index)*(1-x(n, index));
end
index = index + 1;
end
cutOff = 800;
x = x( cutOff :end ,:);
figure
plot (rRange ,x),xlabel('alpha'),ylabel('cycle')
```



3. RandomWalker

```
function xvec=randomwalk_1d(p,N)
step=1
N=100
xvec(1)=0;
for step=2:1:N
      r=rand(1,1);
    if(r<p)
      xvec(step)=xvec(step-1)-1;
    else
      xvec(step)=xvec(step-1)+1;
    end
end
coditation x1=(0.5,100)
```