

---

## Table of Contents

.....	1
Question 1 .....	1
Question 2 .....	3
Question 3 .....	5

% Cory Wolfe

## Question 1

```
t = 0:2; dydt = @(t,y) (1-4*t)^2*sqrt(y);
%a.
tx = linspace(0,2);
yx = (1/36)*(-16*tx.^3+12*tx.^2-3*tx+1).^2;
%b.
[te5, ye5] = eulode(dydt, [0 2], 1, .5)
[te25, ye25] = eulode(dydt, [0 2], 1, .25)
%c.
[tm,ym]=heun(dydt, [0 2], 1, .5,[])
%d.
h = .5; i = 1;
y = zeros(3,1); y(1) =1;
k1 = dydt(t(i),y(i));
k2 = dydt(t(i)+0.5*h,y(i)+0.5*k1*h);
k3 = dydt(t(i)+0.5*h,y(i)+0.5*k2*h);
k4 = dydt(t(i)+h,y(i)+k3*h);
phi = (k1+2*k2+2*k3+k4)/6;
y(i+1) = y(i) + phi*h ;
i=2;
k1 = dydt(t(i),y(i));
k2 = dydt(t(i)+0.5*h,y(i)+0.5*k1*h);
k3 = dydt(t(i)+0.5*h,y(i)+0.5*k2*h);
k4 = dydt(t(i)+h,y(i)+k3*h);
phi = (k1+2*k2+2*k3+k4)/6;
y(i+1) = y(i) + phi*h
plot(tx,yx,te5,ye5, 'bx', te25,ye25, 'o', t,y, 'rx', tm,ym, 'bo')
```

te5 =

```
0
0.5000
1.0000
1.5000
2.0000
```

ye5 =

---

1.0000  
1.5000  
2.1124  
8.6527  
45.4220

te25 =

0  
0.2500  
0.5000  
0.7500  
1.0000  
1.2500  
1.5000  
1.7500  
2.0000

ye25 =

1.0000  
1.2500  
1.2500  
1.5295  
2.7662  
6.5084  
16.7131  
42.2642  
100.7739

tm =

0  
0.5000  
1.0000  
1.5000  
2.0000

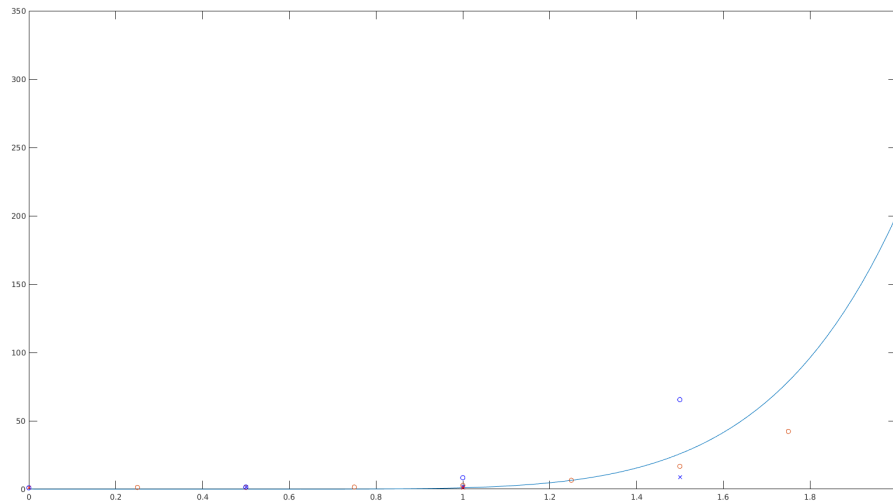
ym =

1.0000  
1.5625  
8.3937  
65.4916  
342.9163

y =

---

1.0000  
1.1667  
25.3059



## Question 2

```
[t1,x1] = ode45(@msd,[0,10],[2,0],[],28,15,100);  
[t2,x2] = ode45(@msd,[0,10],[2,0],[],28,60,100);  
[t3,x3] = ode45(@msd,[0,10],[2,0],[],28,250,100);  
figure(2),plot(t1,x1(:,1))  
hold  
plot(t2,x2(:,1))  
plot(t3,x3(:,1))  
hold  
legend('c=15','c=60','c=250')  
l1 = length(x1);l2 = length(x2);l3 = length(x3);  
int15=trapz(t1,x1);  
int60=trapz(t2,x2);  
int250=trapz(t3,x3);  
int15(1)  
int60(1)  
int250(1)
```

*Current plot held*  
*Current plot released*

*ans =*

0.2938

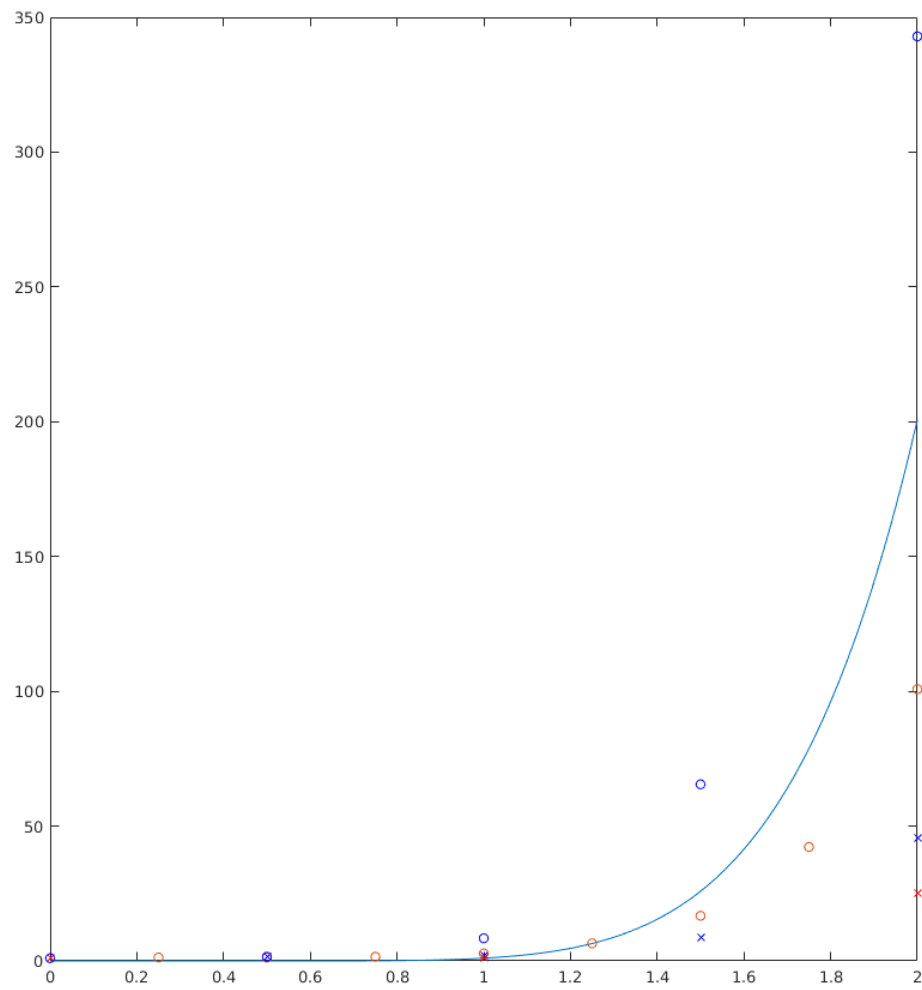
*ans =*

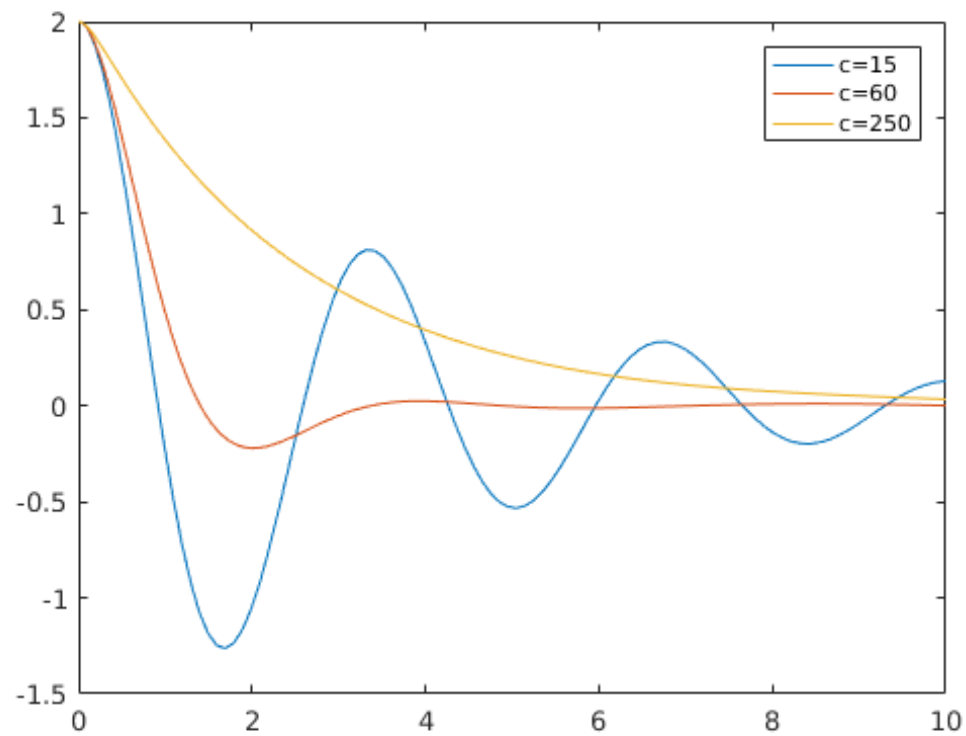
---

1.2213

*ans* =

4.9378

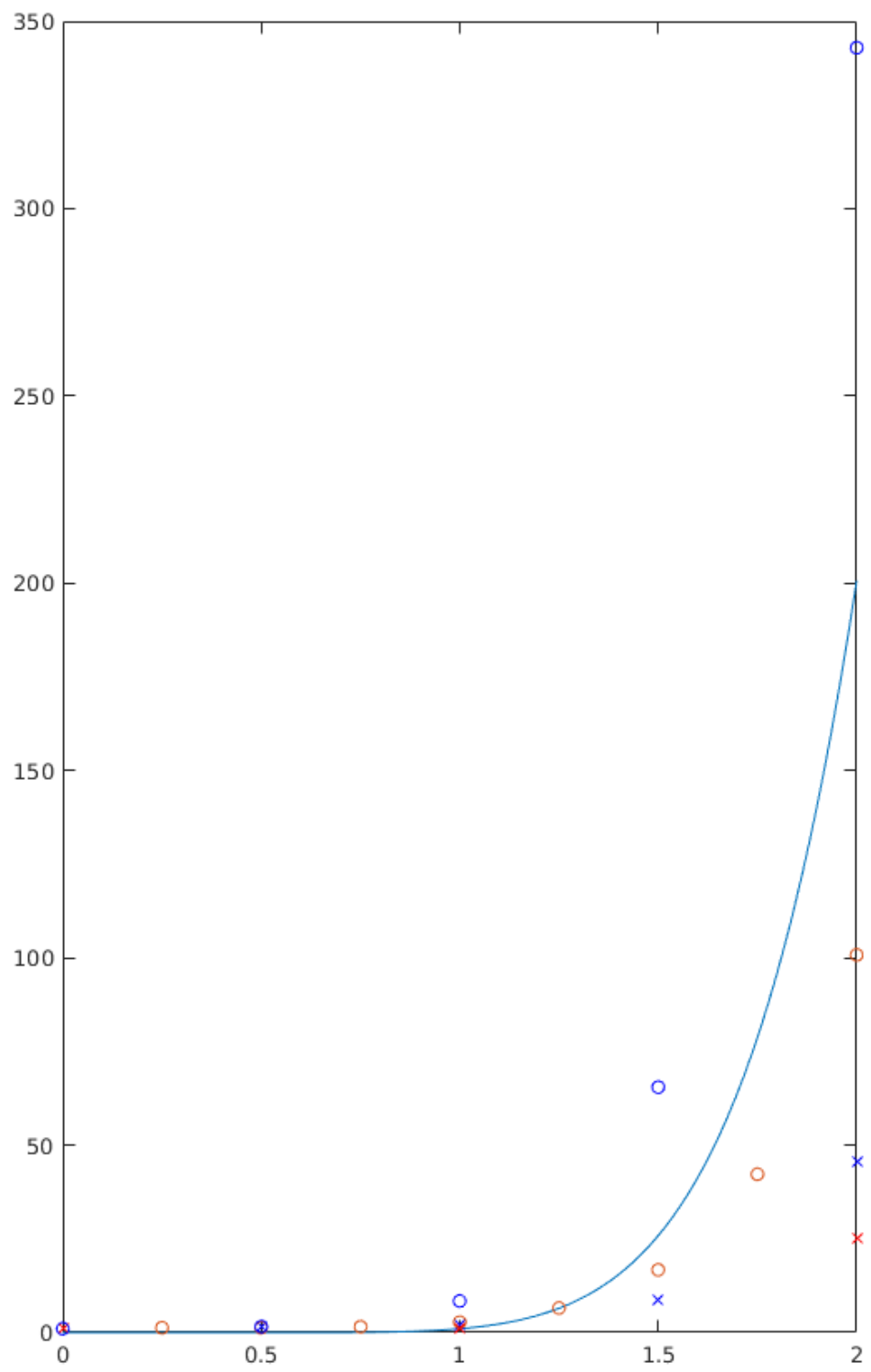


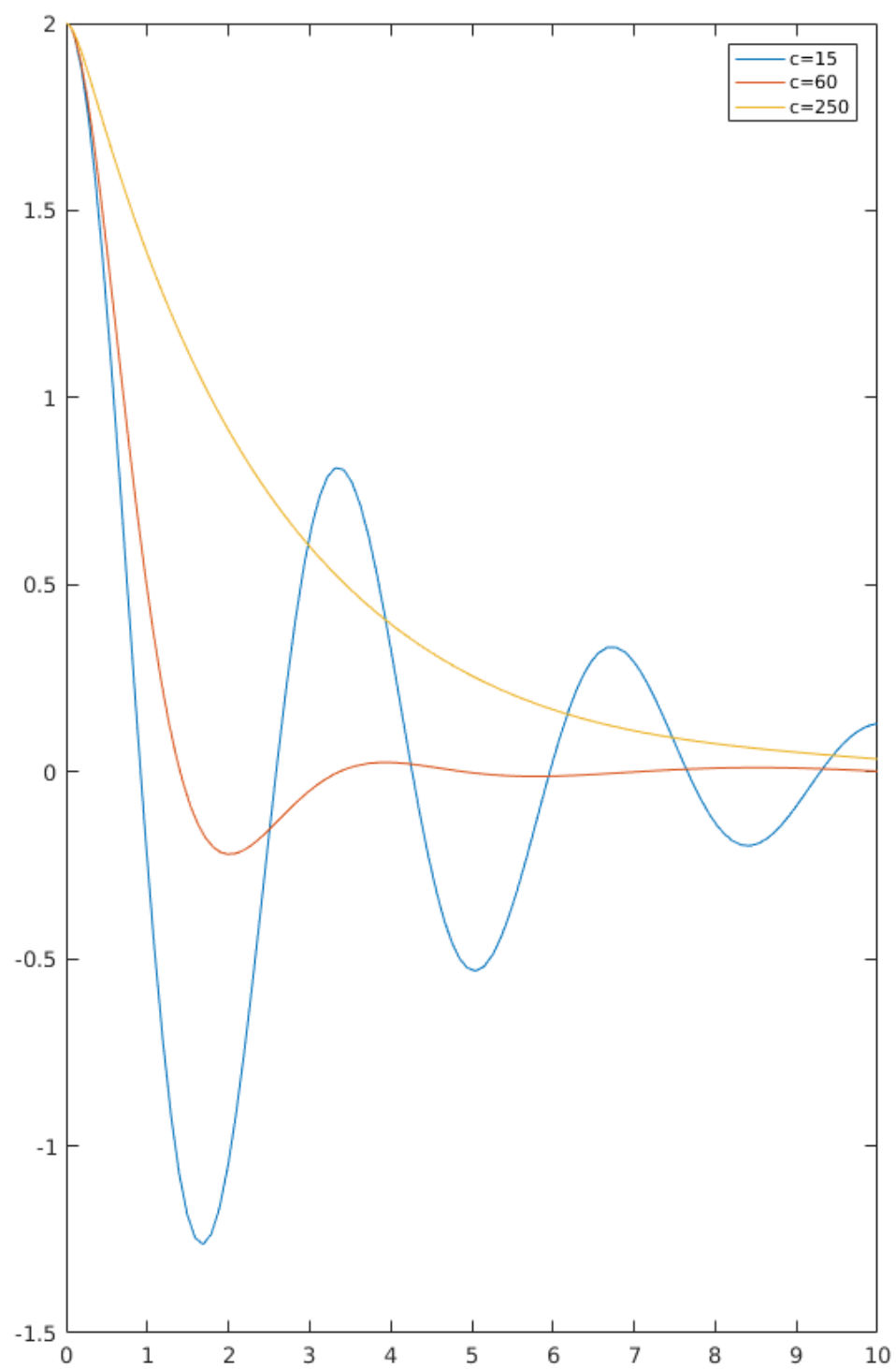


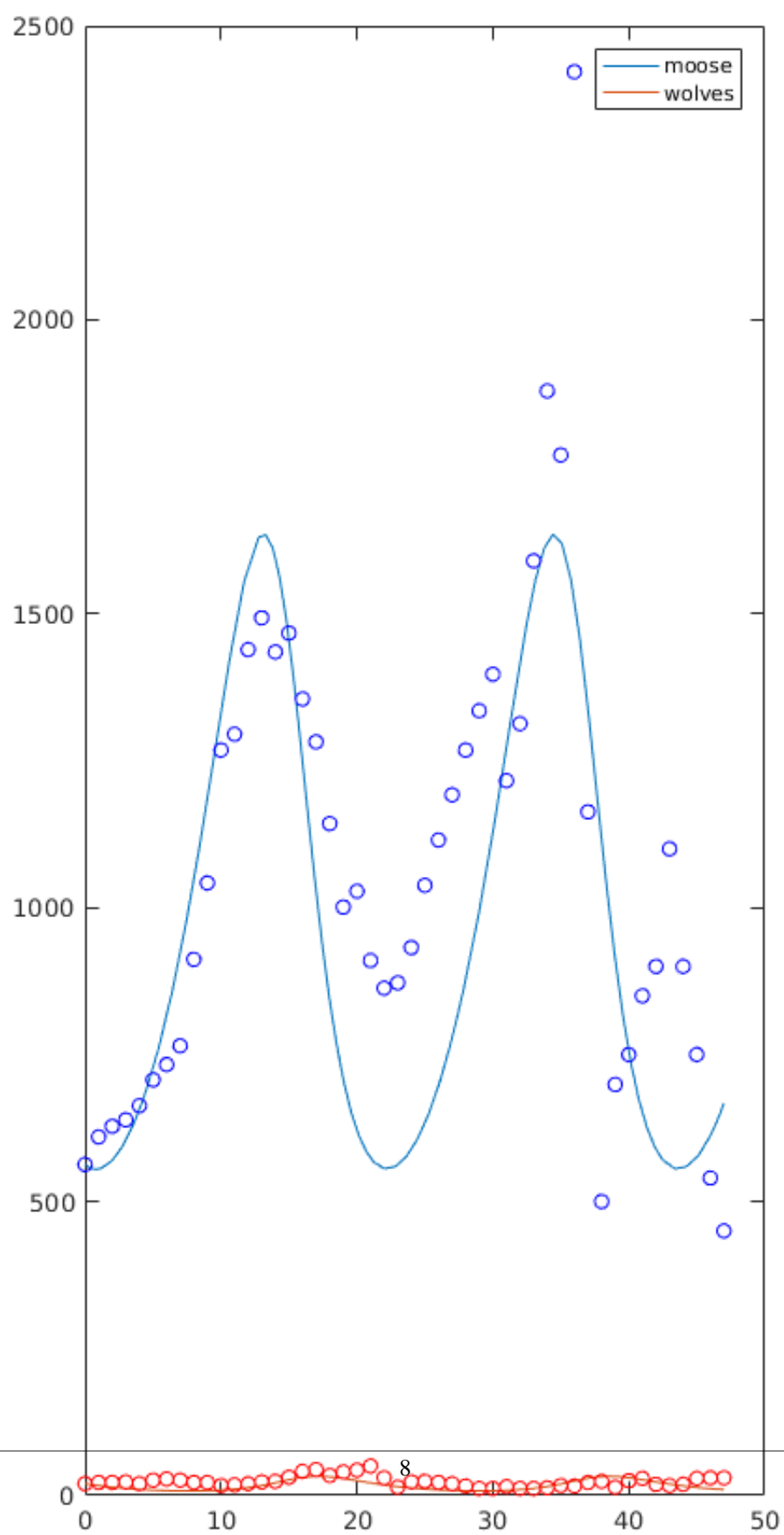
### Question 3

```
[t,u] = ode45(@pprey,[0,47],[563,20]);
data=csvread('population.csv');
t2=data(:,1);
t2 = t2-1959;
um = data(:,2);
uw = data(:,3);
intm = trapz(t,u(:,1));
intw = trapz(t,u(:,2));
figure(3),plot(t,u),legend('moose','wolves')
hold
plot(t2,um,'bo',t2,uw,'ro')
hold
figure(4),plot(u(:,1),u(:,2)),xlabel('moose'),ylabel('wolves')
```

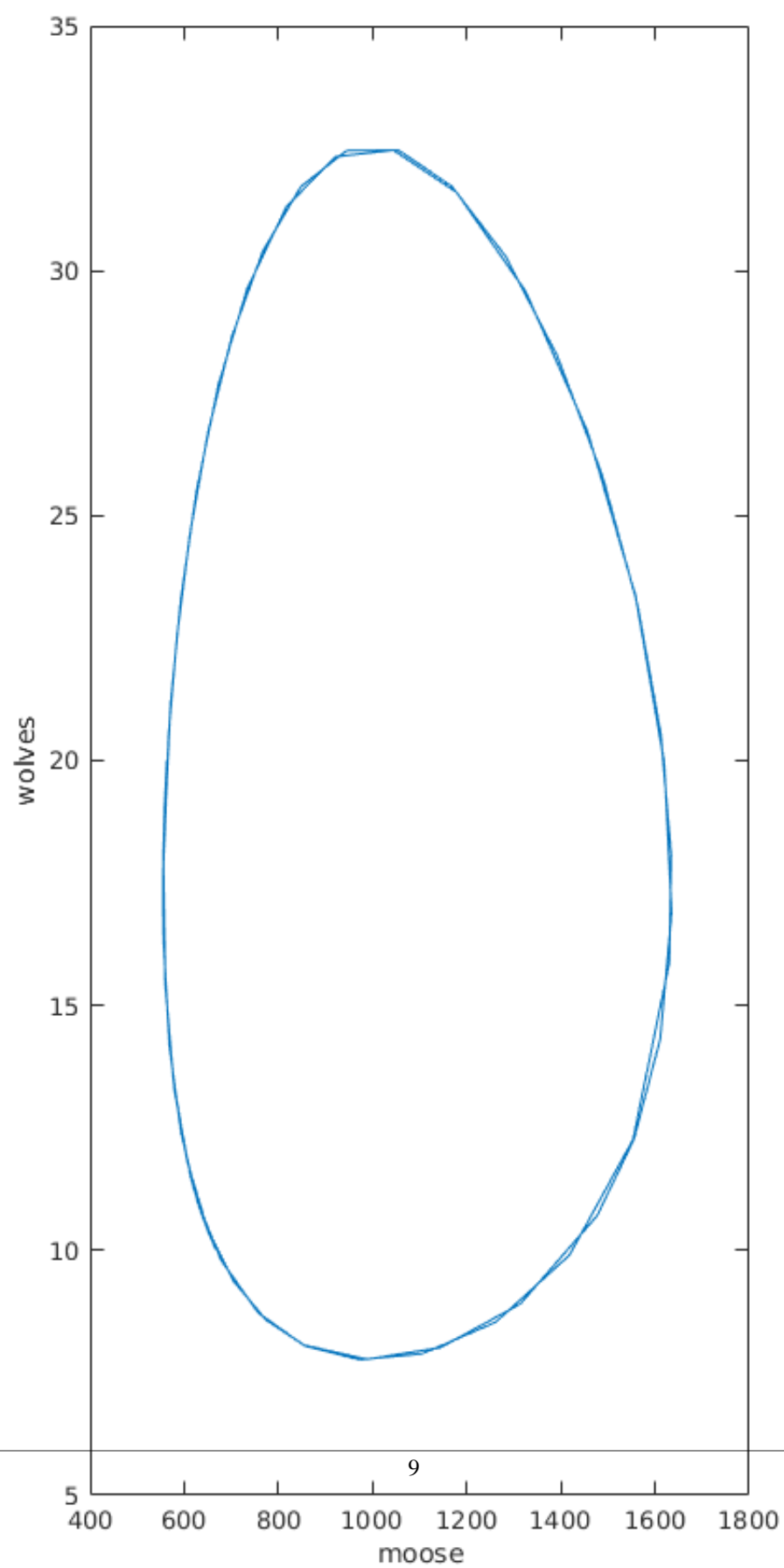
*Current plot held*  
*Current plot released*











---

*Published with MATLAB® R2016b*