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% Cory Wolfe

## Part I

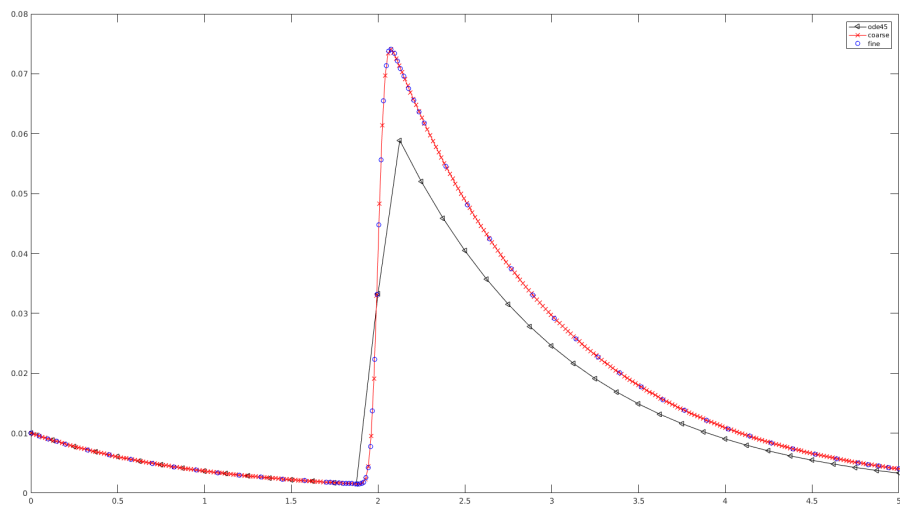
```
tspan = [0,5];y0=.01;
dydt = @(t,y) exp(-(t-2)^2/.002)-y;
[tcoarse, ycoarse] = rk4sys(dydt,tspan,y0,.125);
[tfine, yfine] = rk4sys(dydt,tspan,y0,.0162);
[t45,y45] = ode45(dydt,tspan,y0);
plot(tcoarse,ycoarse,'k<-',tfine,yfine,'rx-',t45,y45,'bo')
legend('ode45','coarse','fine')
dt_min=min(diff(t45)), dt_max=max(diff(t45))
```

*dt\_min* =

0.0123

*dt\_max* =

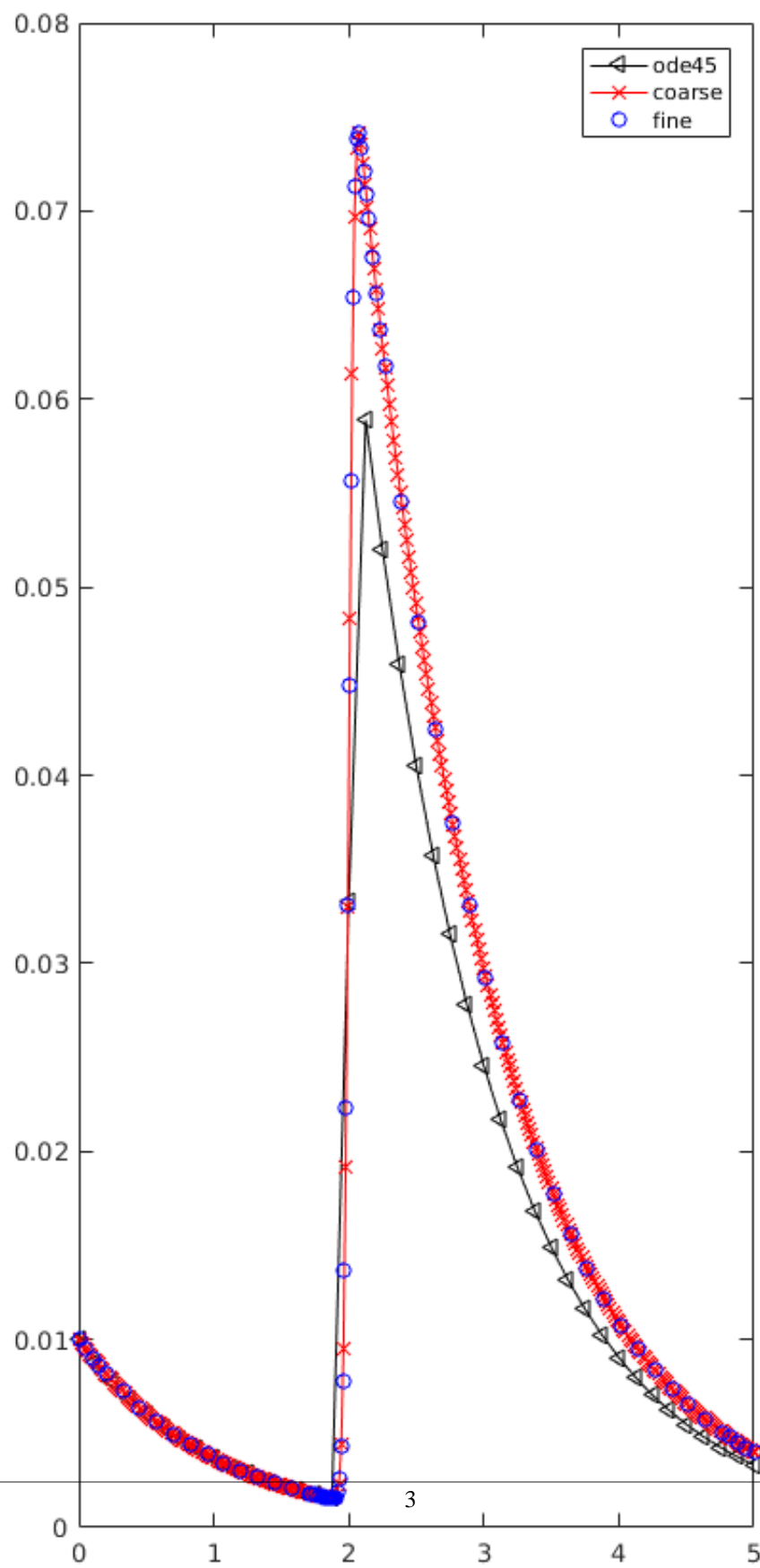
0.1250

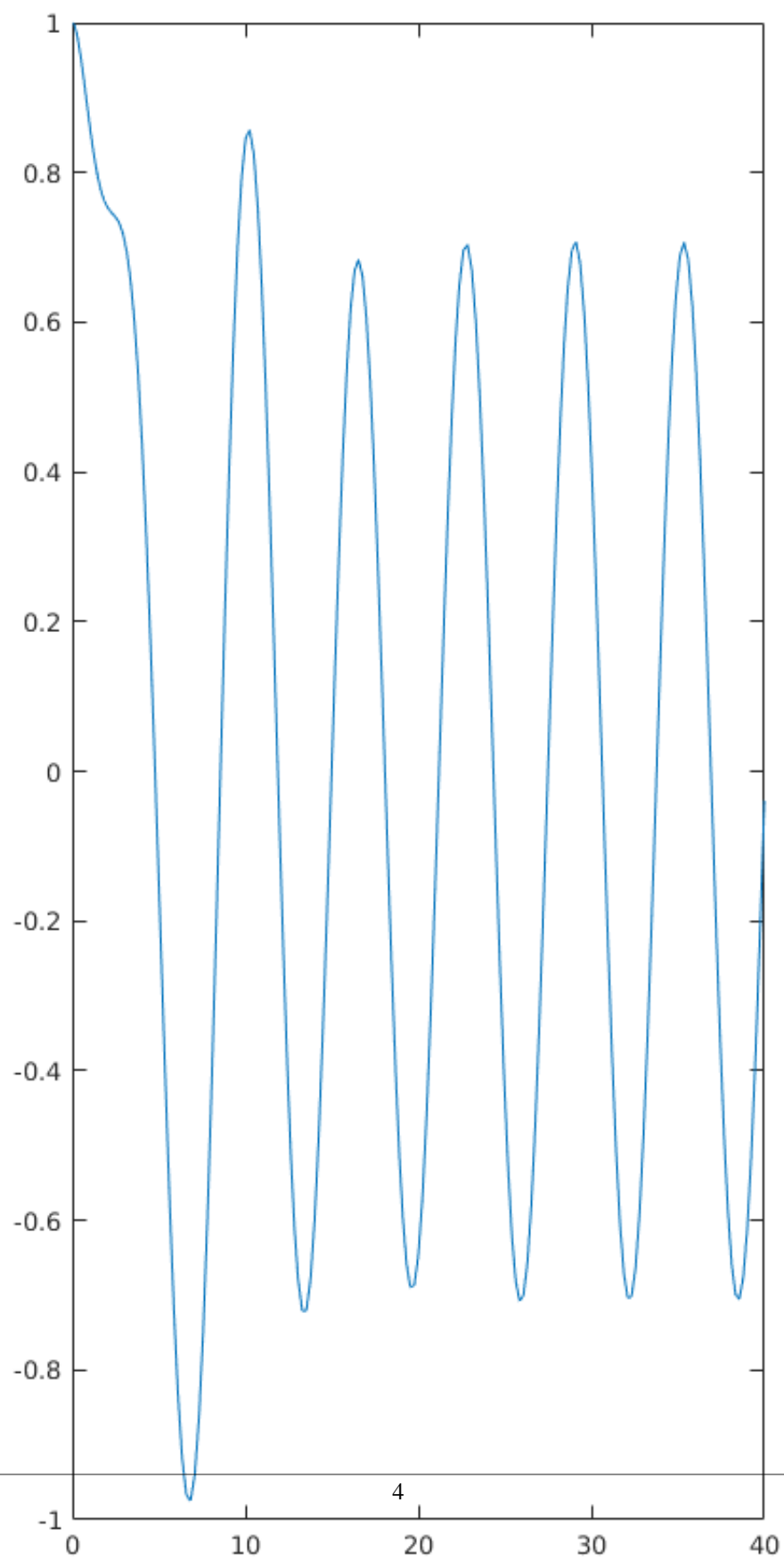


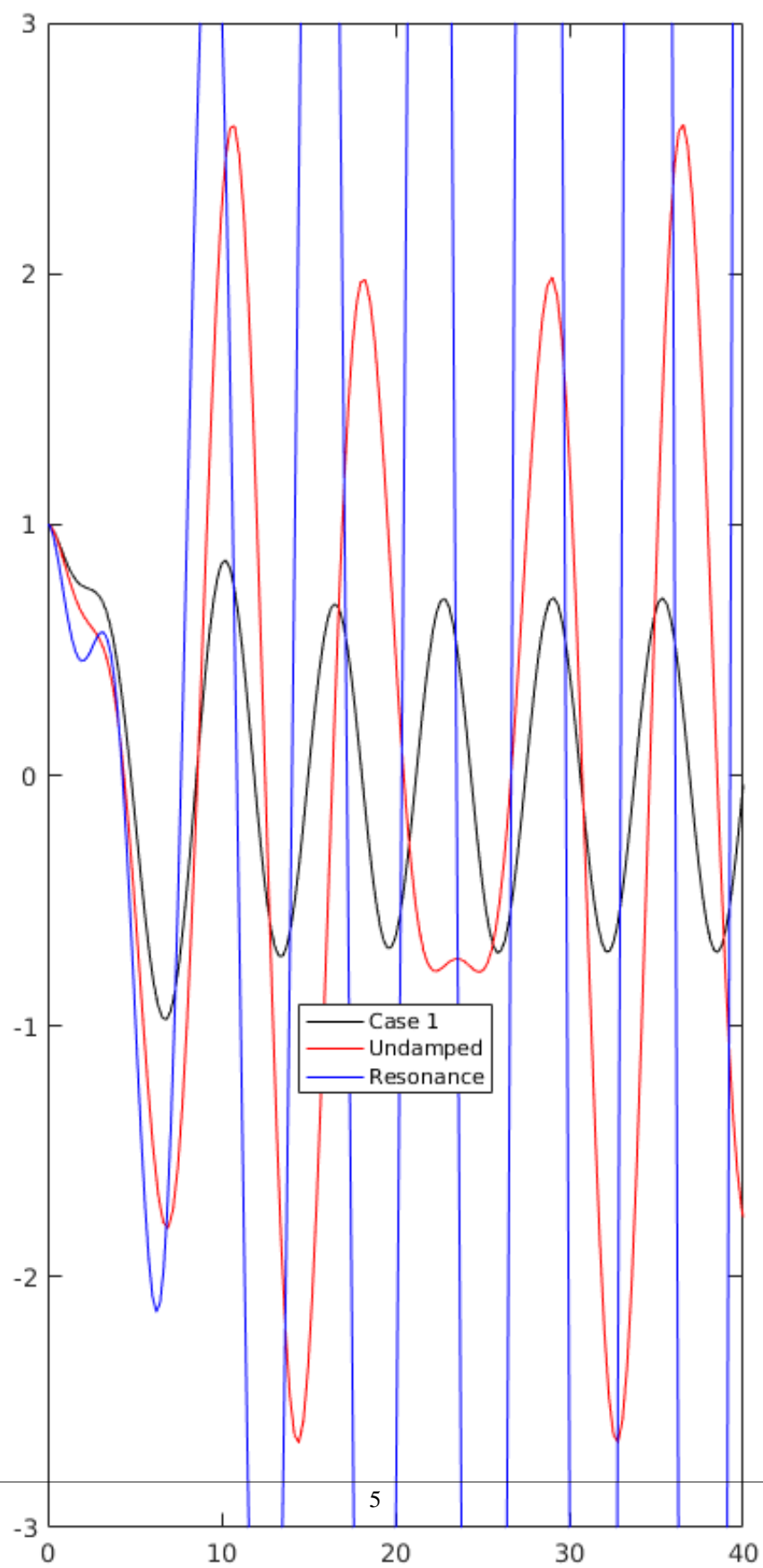
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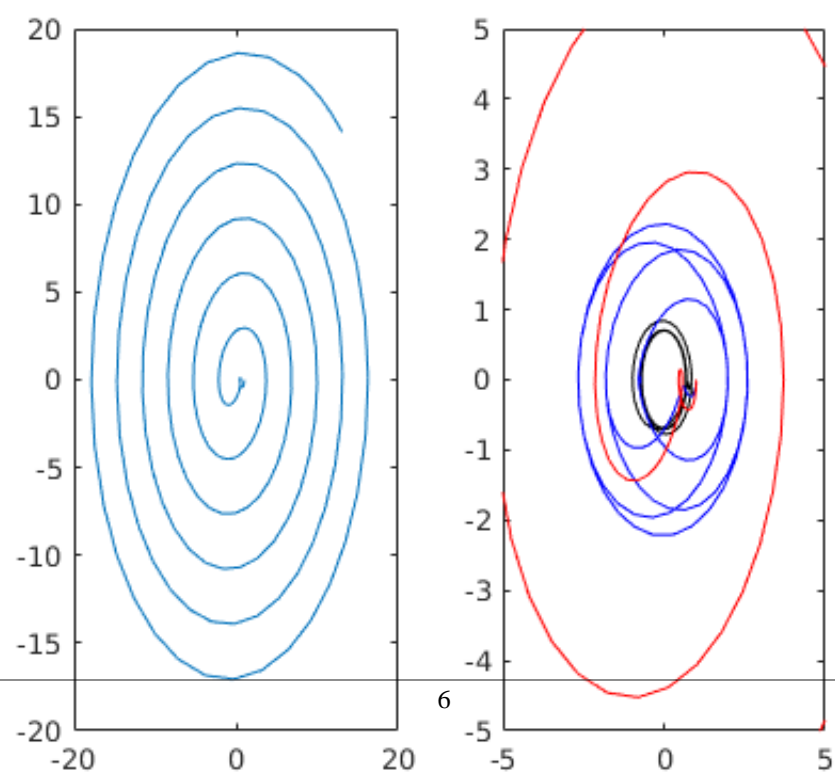
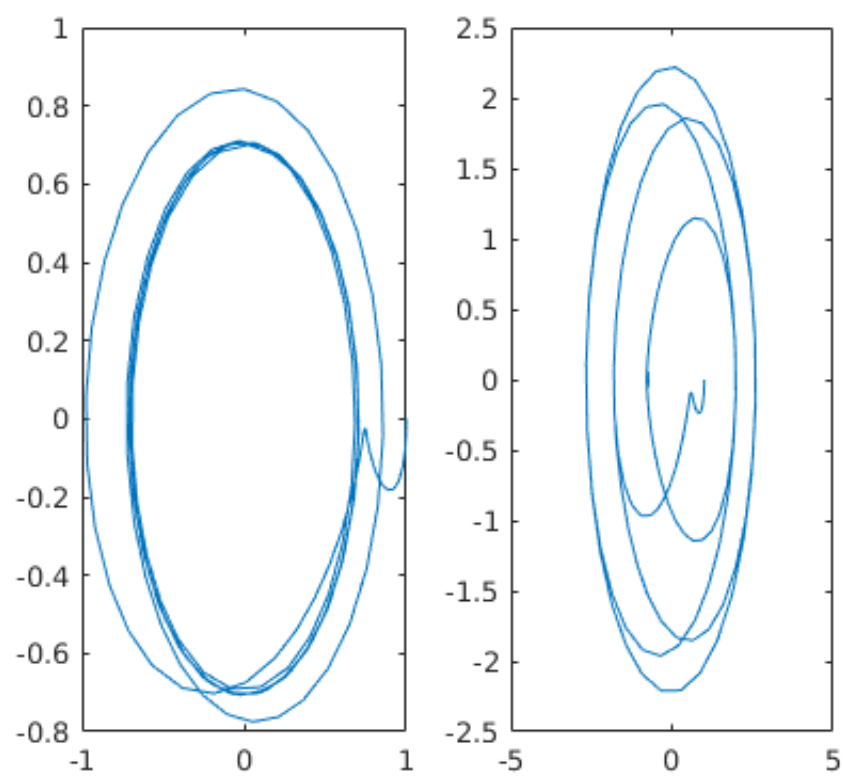
# Mass-Spring-Damper

```
[t1,x1] = ode45(@msd,[0 40],[1 0],[],2,1,1);
figure(1), plot(t1,x1(:,1))
[t2,x2] = ode45(@msd,[0 40],[1 0],[],2,0,1);
[t3,x3] = ode45(@msd,[0 40],[1 0],[],1,0,1);
figure(2), plot(t1,x1(:,1), 'k', t2,x2(:,1), 'r', t3,x3(:,1), 'b')
axis([0 40 -3 3])
legend('Case 1', 'Undamped', 'Resonance', 'Location', 'best')
figure(3)
subplot(2,2,1), plot(x1(:,1),x1(:,2))
subplot(2,2,2), plot(x2(:,1),x2(:,2))
subplot(2,2,3), plot(x3(:,1),x3(:,2))
subplot(2,2,4),
plot(x1(:,1),x1(:,2), 'k', x2(:,1),x2(:,2), 'b', x3(:,1),x3(:,2), 'r')
axis([-5 5 -5 5])
```





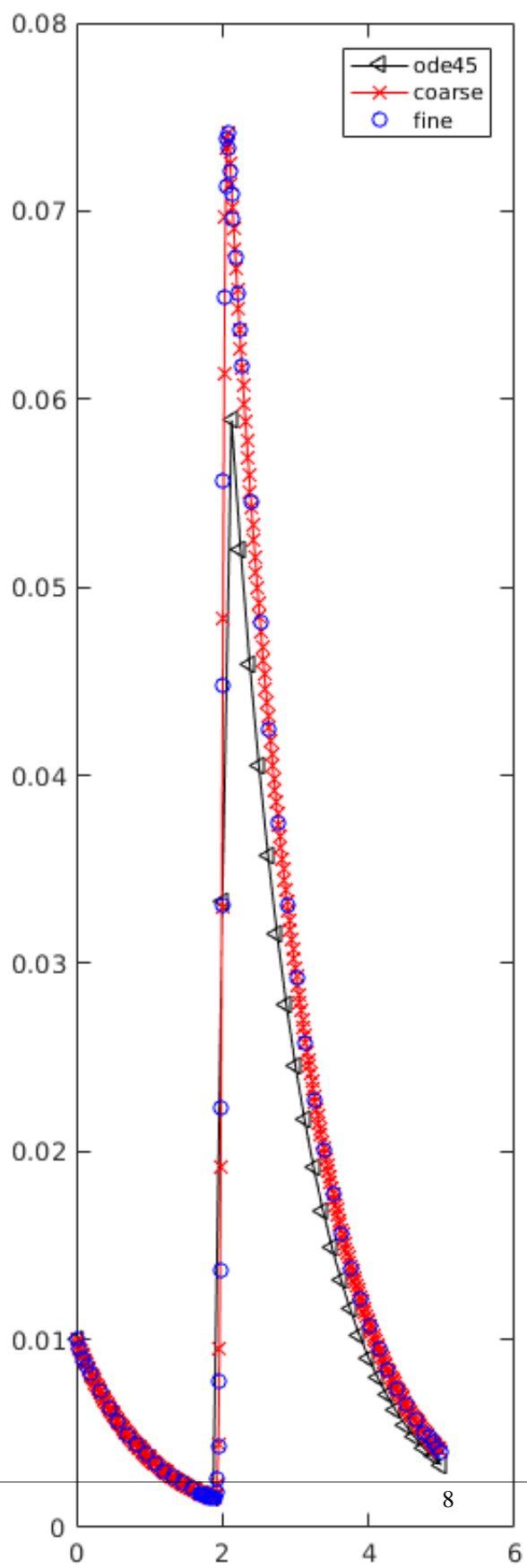




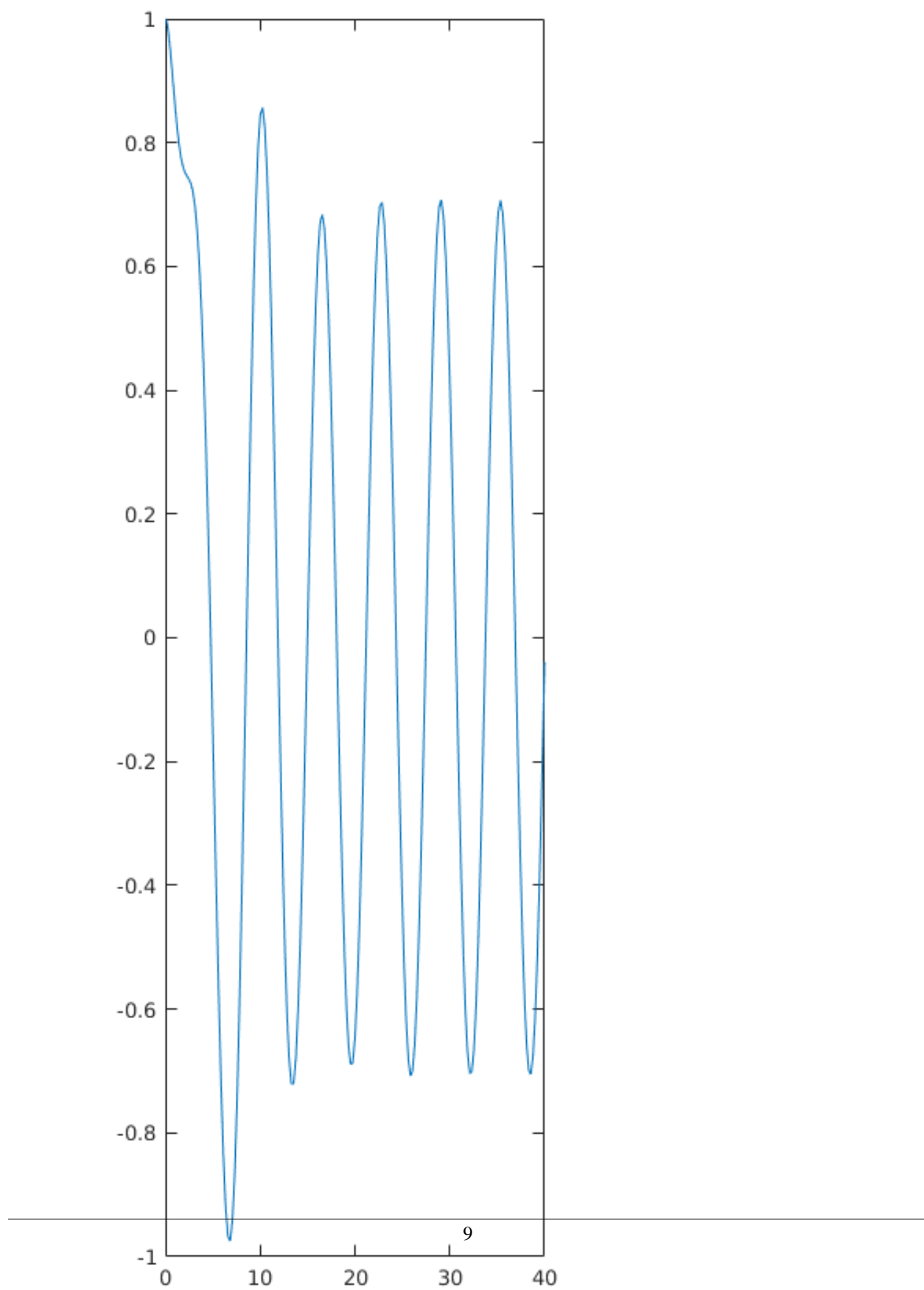
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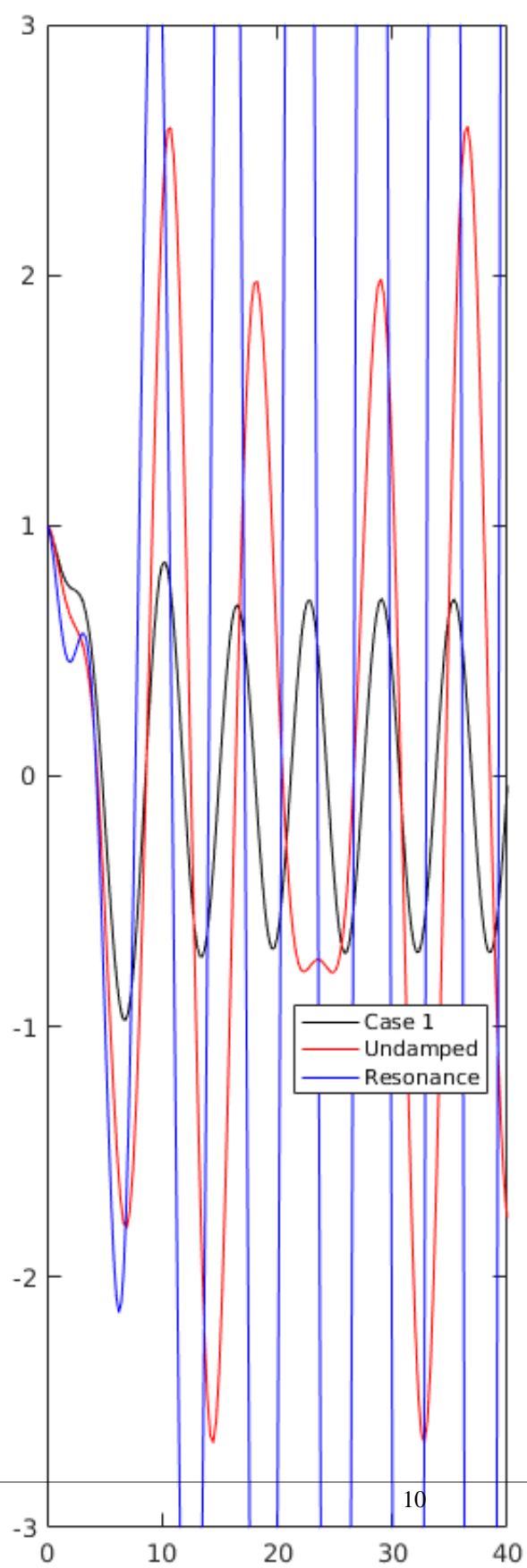
## Pred-Prey

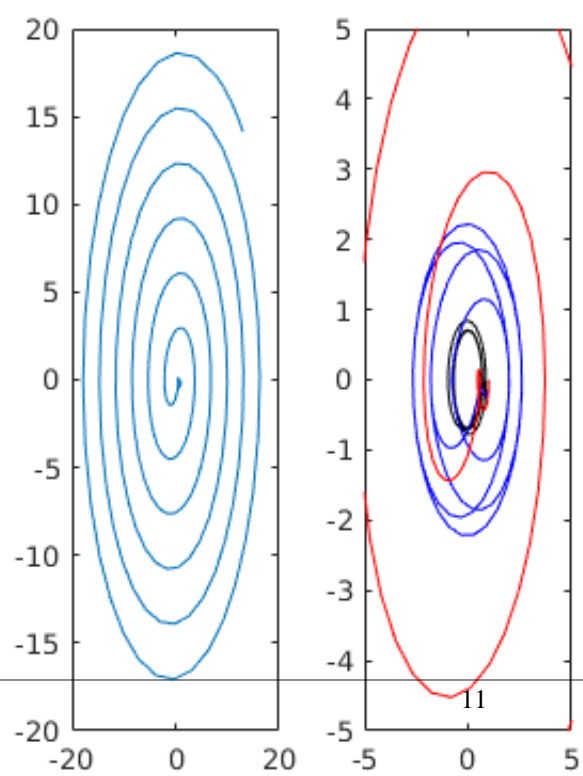
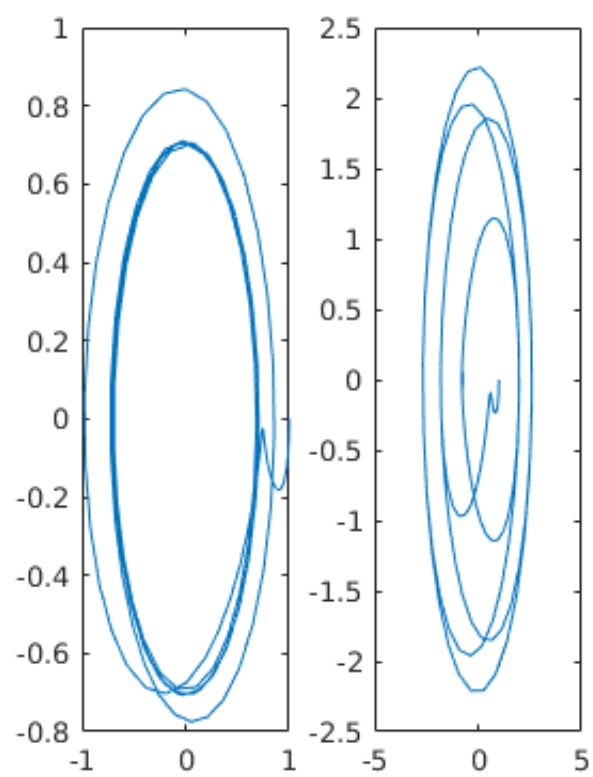
```
[t,u] = ode45(@predprey,[0 20],[2 1]);  
figure(4), plot(t,u), legend('rabbits','foxes')  
figure(5), plot(u(:,1),u(:,2)),xlabel('rabbits'),ylabel('foxes')  
[t,u] = ode45(@predprey,[0 20],[15 1]);
```

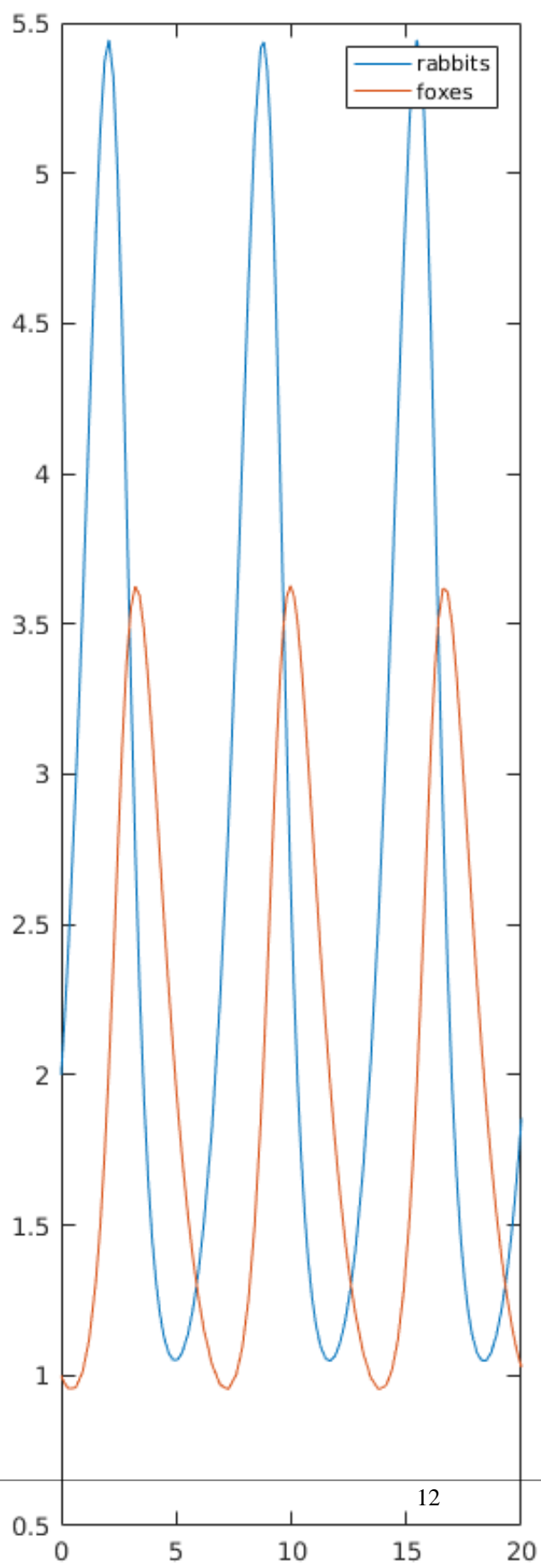


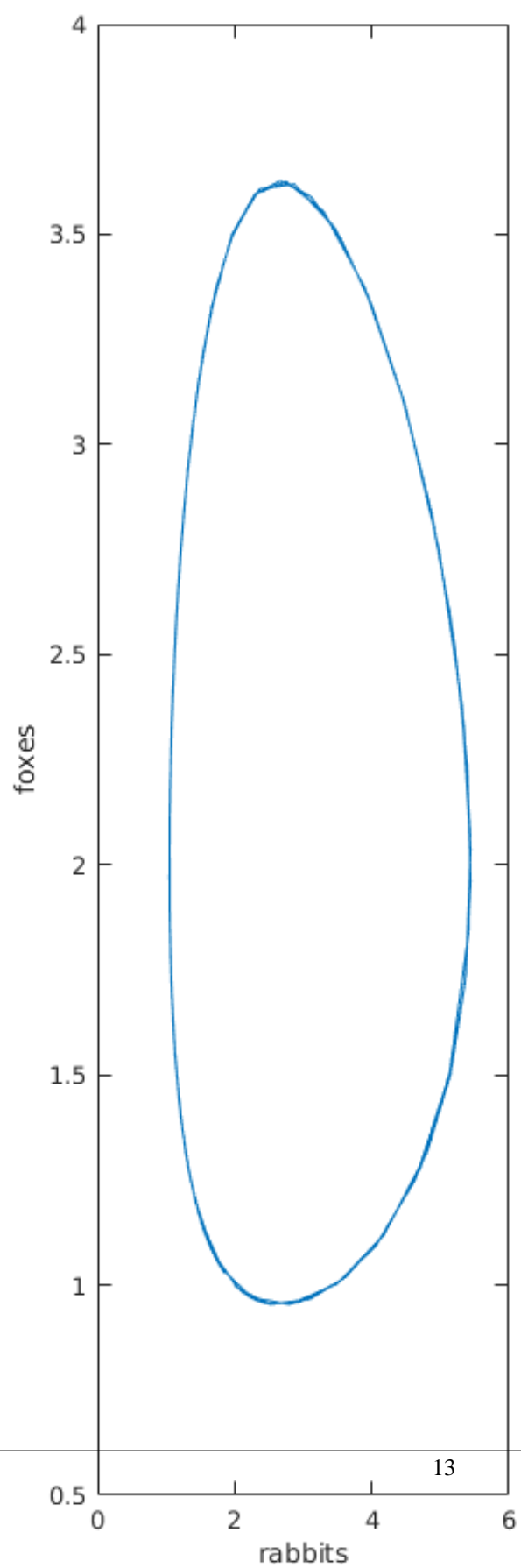












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