

Rajan Sharma
MATH 246
Peng 9AM
Extra Credit Project

CODE

warning off all

```
f=@(t,x) [x(1)*(1.5-x(1)-.5*x(2));x(2)*(2-x(2)-.75*x(1))];
g=@(t,x) [x(1)*(1.5-.5*x(2));x(2)*(-.5+x(1))];
% Keep:0,.1, .15 ,.25,.35,.5,.6, .75,.85,1
for a=[0,0.1,0.15,0.25,0.35,0.5,0.6,0.75,0.85,1];
    figure();hold on
    for i=0:7
        [t1,x1]=ode45(f,[0 3],[i 7-i]);
        [t2,x2]=ode45(g,[0 3],[i 7-i]);
        minlen=min([length(x1),length(x2)]);
        x=(1-a)*x1(1:minlen,:)+a*x2(1:minlen,:);
        plot(x(:,1),x(:,2))
    end
    axis([0 5 0 20])
end
```

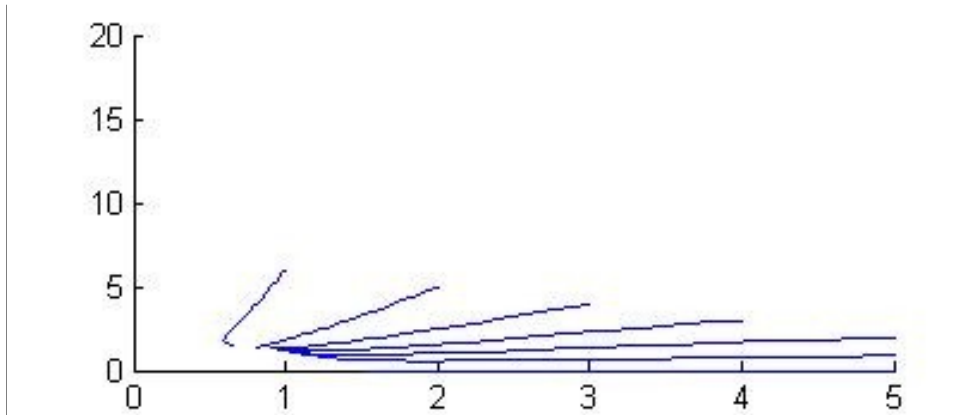


Figure 1-($a=0$)-Here The graph only shows the first problem, as the alpha value cancels out the second problem. The lines are originating at the stationary point (0,0) and are relatively straight as they originate from the radial source.

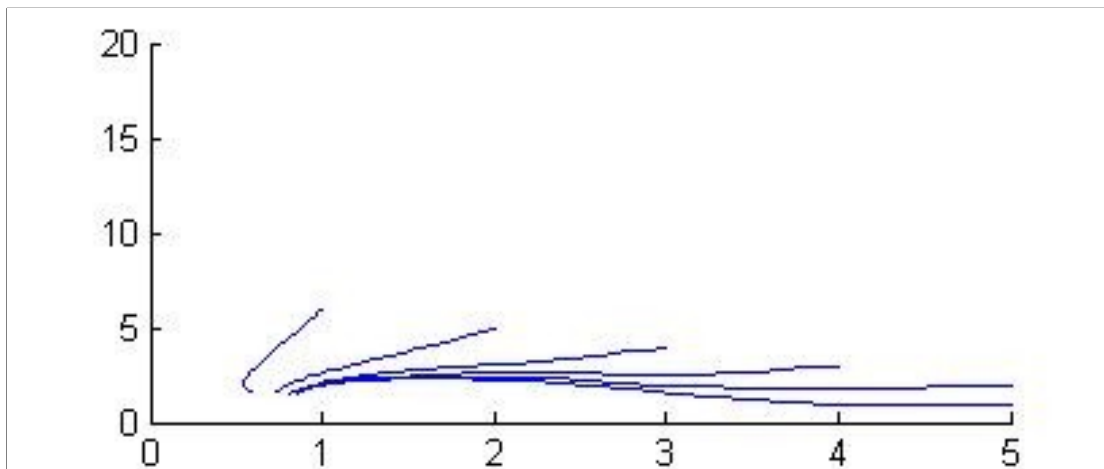


Figure 2-($a=.1$) This figure shows that the stationary point is beginning to shift towards the center as the lines lose their linearity, and begin to curve.

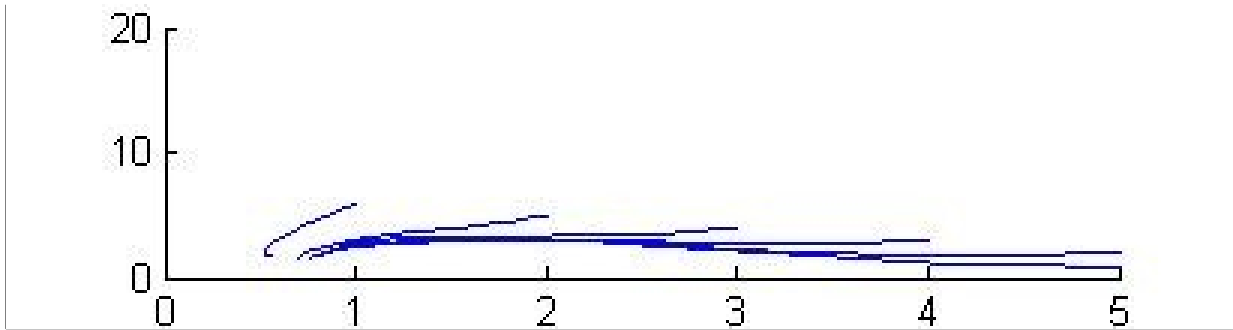


Figure 3-($a=.15$) This figure continues to show the continuing of spiral around the adjusted stationary point.

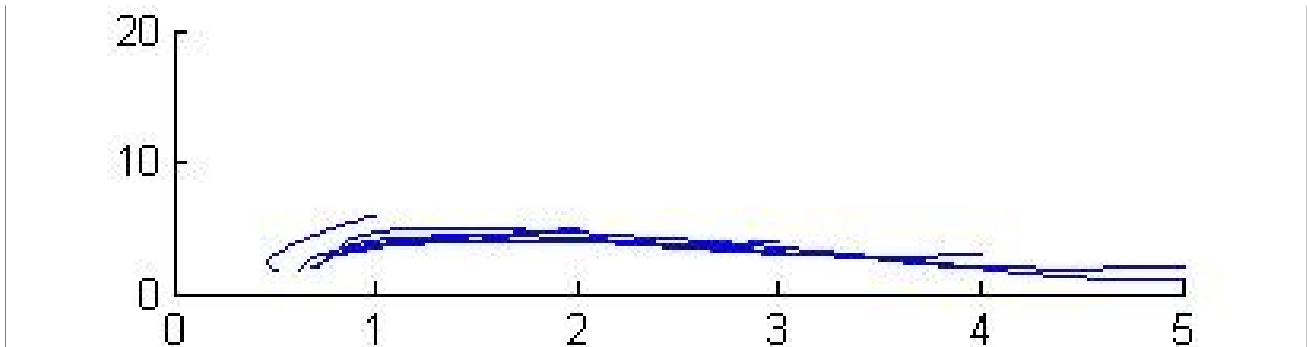


Figure 4-($a=.25$) This figure shows the clear beginning of the center, although the lines begin to merge together.

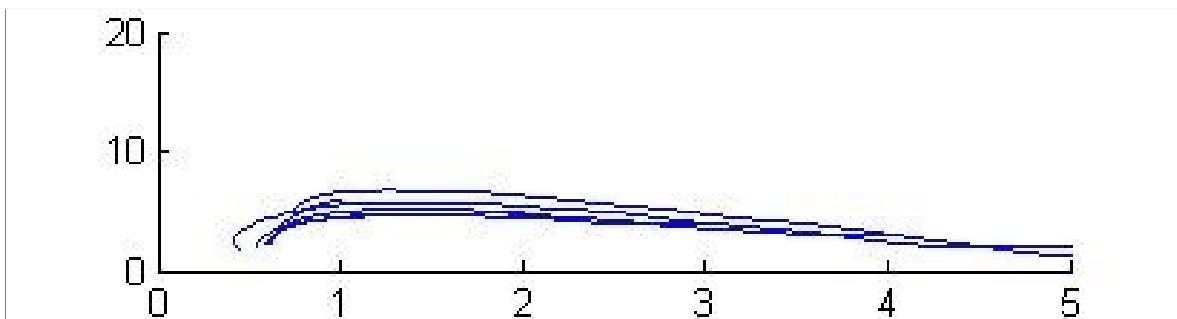


Figure 5-($a=.35$) The spiral is clearly visible as it begins to emerge further from the center.

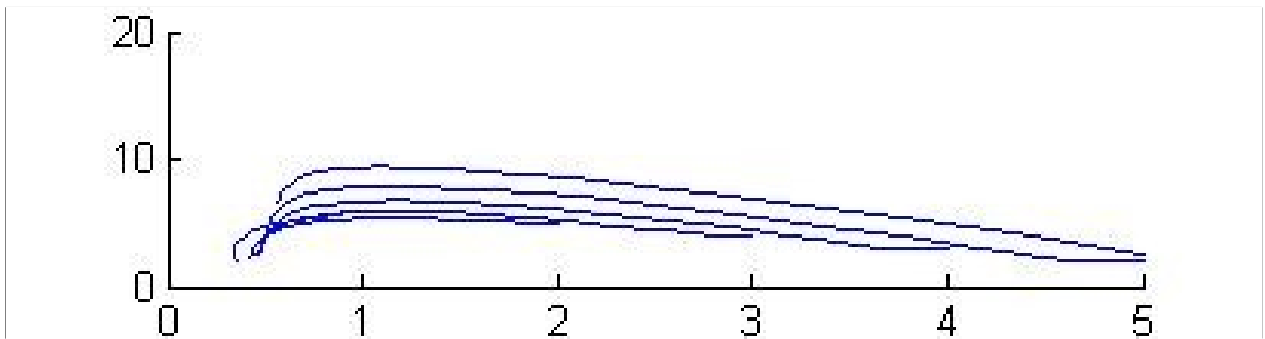


Figure6-($a=.5$) This figure shows that both problems are equally represented as the values of alpha are equal to one half. The portrait has clearly begun to spiral but also expand outward as the distance between the lines begins to increase. The lines begin to take on a center shape.

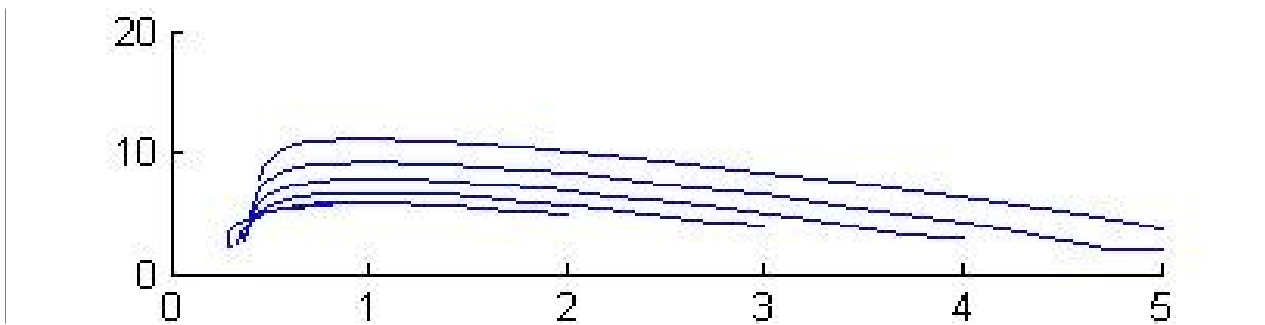


Figure7-($a=.6$) The center is clearly depicted as the orbits begin to form with elliptical paths.

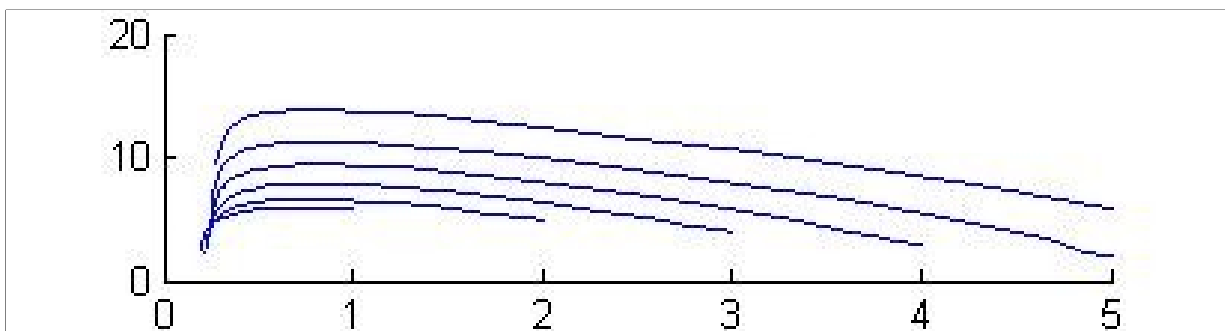


Figure8-($a=.75$) The lines continue about the center although there is clear linearity amongst all of the lines as they travel away from the center.

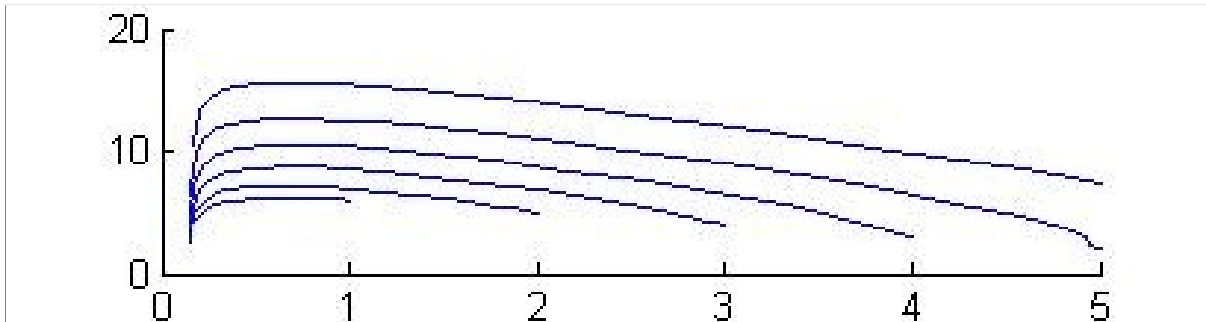


Figure9-($a=.85$) The center is very well defined as the lines continue their linear nature further from the center.

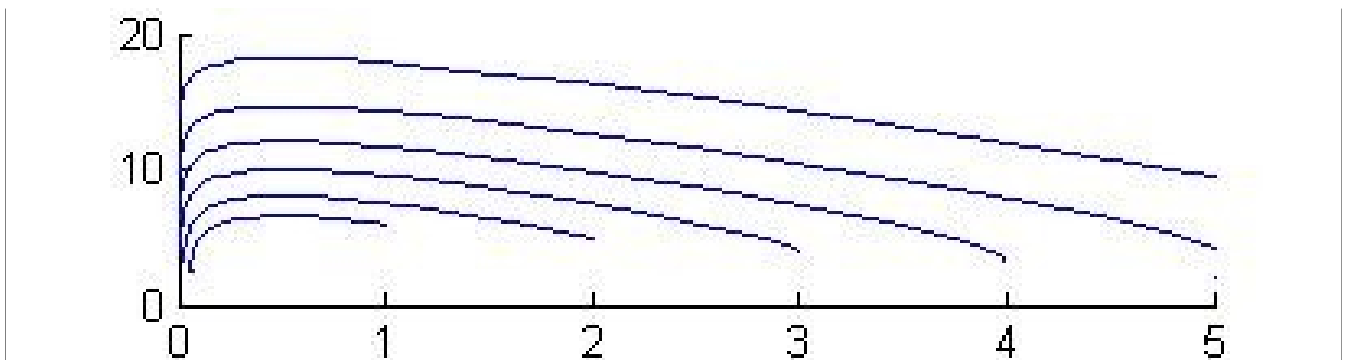


Figure10-($a=1$)The final figure shows that the graph for $a=1$ which only represents the second problem since the first problem is canceled out. There is a continuation of spiraling and there is a large increase for the size of the spirals as the upmost point goes from approx 15 to around 20 when compared to the $a=.85$ portrait.