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```
% Cory Wolfe
```

Positive Definite

```
A = [5,4,7;4,9,1;7,1,3];
%u = chol(A)
eig(A)
A = A +4*eye(3);
eig(A)
u = chol(A)
```

```
ans =

   -3.3752
    6.4438
   13.9314
```

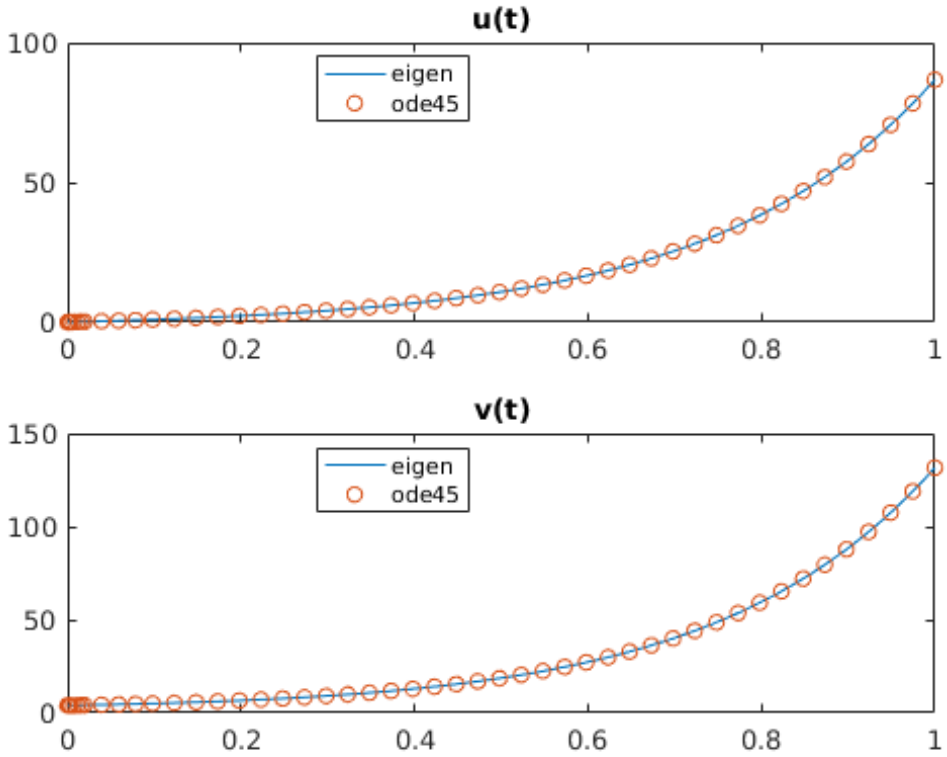
```
ans =

    0.6248
   10.4438
   17.9314
```

```
u =

    3.0000    1.3333    2.3333
         0    3.3500   -0.6302
         0         0    1.0763
```

IVP with Eig

```
B = [1,2;3,2];
eig(B)
[V,D] = eig(B)
C = V\[0;4]
u = @(t) C(1)*exp(-t)*V(1,1)+C(2)*exp(4*t)*V(1,2);
```

```
v = @(t) C(1)*exp(-t)*V(2,1)+C(2)*exp(4*t)*V(2,2);
u(0),v(0)
[t45,x45] = ode45(@dxdt,[0,1],[0,4]);
teig = linspace(0,1);
figure(1)
subplot(2,1,1),plot(teig,u(teig),t45,x45(:,1),'o')
legend('eigen','ode45','Location','best')
title('u(t)')
subplot(2,1,2),plot(teig,v(teig),t45,x45(:,2),'o')
legend('eigen','ode45','Location','best')
title('v(t)')


ans =

    -1
     4


V =

   -0.7071   -0.5547
    0.7071   -0.8321


D =

    -1     0
     0     4


C =

    2.2627
   -2.8844


ans =

   2.2204e-16


ans =

     4
```

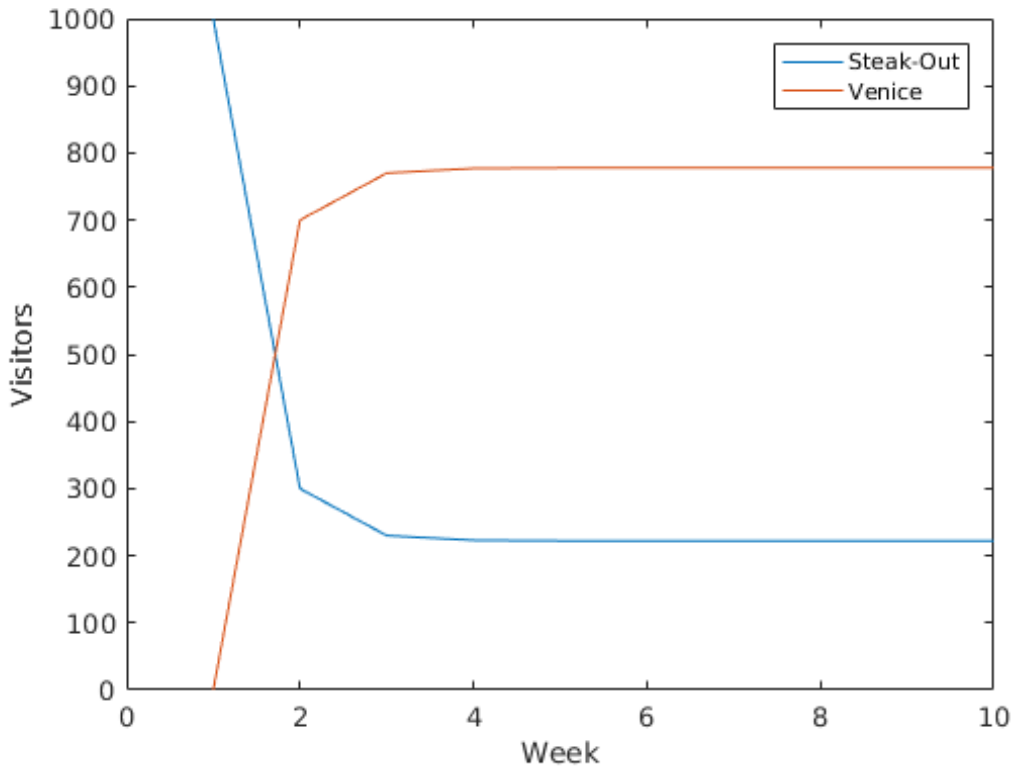


Eats

```
d = [.3,.2;.7,.8];
x = zeros(2,10);x(:,1)=[1000;0];
for i = 1:9
    x(:,i+1) = d*x(:,i);
end
x
figure(2)
plot(1:10,x),legend('Steak-Out','Venice')
xlabel('Week'),ylabel('Visitors')
[V,d] = eig(d)
1000*V(:,2)/sum(V(:,2))
```

```
x =

   1.0e+03 *

  Columns 1 through 7

    1.0000    0.3000    0.2300    0.2230    0.2223    0.2222    0.2222
         0    0.7000    0.7700    0.7770    0.7777    0.7778    0.7778

  Columns 8 through 10
```

```
    0.2222    0.2222    0.2222
    0.7778    0.7778    0.7778


V =

   -0.7071   -0.2747
    0.7071   -0.9615


d =

    0.1000         0
         0    1.0000


ans =

  222.2222
  777.7778
```



Orthogonality of Eigenvectors

```
[V,D] = eig(A);
V(:,1)'*V(:,2)
```

```
dot(V(:,1),V(:,3)),dot(V(:,2),V(:,3))
```

```
ans =

   1.6653e-16
```

```
ans =

   1.6653e-16
```

```
ans =

  -1.9429e-16
```

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