

```
>> syms x y x1 x2 t lambda L
>> A=[1 2; 6 5];
>> [xi,R]=eig(sym(A))
```

xi =

```
[-1, 1/3]
[ 1,  1]
```

R =

```
[-1, 0]
[ 0, 7]
```

```
>> A=[3 -4;1 -1];
>> [xi,R]=eig(sym(A))
```

xi =

```
2
1
```

R =

```
[ 1, 0]
[ 0, 1]
```

```
>> M=[2 -4; 1 -2];
>> eta=M\xi
```

Warning: System is rank deficient. Solution is not unique.

eta =

```
1
0
```

```
>>[x1,x2]=dsolve('Dx1=x2','Dx2=-x1','t')
```

x1 =

$C2*\cos(t) + C1*\sin(t)$

x2 =

$C1*\cos(t) - C2*\sin(t)$

```
>>[x1,x2]=dsolve('Dx1=x2','Dx2=-x1','x1(0)=1','x2(0)=3','t')
```

```
x1 =
```

```
cos(t) + 3*sin(t)
```

```
x2 =
```

```
3*cos(t) - sin(t)
```

```
>> ivp='Dx=-3*x+2*y,Dy=-x,x(0)=1,y(0)=0';
```

```
>> [x,y]=dsolve(ivp,'t');
```

```
>> xf=@(t) eval(vectorize(x));
```

```
>> yf=@(t) eval(vectorize(y));
```

```
>> t=-0.3:0.1:5;
```

```
>> plot(xf(t),yf(t))
```

```
>> xlabel 'x'
```

```
>> ylabel 'y'
```

```
>>syms a b
```

```
>> ivp='Dx=x-2*y,Dy=-x,x(0)=a,y(0)=b';
```

```
>> [x,y]=dsolve(ivp,'t');
```

```
>> xf=@(t,a,b) eval(vectorize(x));
```

```
>> yf=@(t,a,b) eval(vectorize(y));
```

```
>> figure; hold on
```

```
>> t=-3:0.1:3;
```

```
>> for a=-2:2
```

```
for b=-2:2
```

```
plot(xf(t,a,b),yf(t,a,b))
```

```
end
```

```
end
```

```
>> hold off
```

```
>> axis([-20 20 -15 15])
```

```
>> xlabel 'x'
```

```
>> ylabel 'y'
```

```
>> ivp='Dx=x+2*y, Dy=-x,x(0)=a,y(0)=0';
```

```
>> [x,y]=dsolve(ivp,'t');
```

```
>> xf=@(t,a) eval(vectorize(x));
```

```
>> yf=@(t,a) eval(vectorize(y));
```

```
>> figure; hold on
```

```
>> t=-10:0.1:10;
```

```
>> for a=-4:4
```

```
plot(xf(t,a),yf(t,a))
```

```
end
```

```
>> hold off
```

```
>> axis([-15 15 -10 10])
```

```
>> xlabel 'x'
```

```
>> ylabel 'y'  
>>
```