A Matlab code follows that gives analytical solutions to arbitrary systems of autonomous linear differential equations

For example the system from the exercise 9 (c) is defined by the command: eqns = [diff(y,t)==3*y+z, diff(z,t)==-y+3*z];

```
syms y(t) z(t)
eqns = [diff(y,t)==3*y+z, diff(z,t)==-y+3*z];
sol = dsolve(eqns);
soly(t) = sol.y
solz(t) = sol.z
```

A Matlab code follows that lets to draw interactively a phase portrait to arbitrary systems of autonomous linear differential equations.

Diagonal elements in the matrix D give eigenvalues, matrix V gives egenvectors.

```
t0 = 0; % starttid
tend = 20; % sluttid
A=[ 3 , 1  ;
   -1  , 3 ]; %  matris
[V,D]=eig(A)%  D - egenvärden, V- egenvektorer
button=1;
       xlabel('x1');
       ylabel('x2');
       axis equal
       axis([-5,5, -5, 5])

       hold on;
       L=10;
       plot([-L*V(1,1);L*V(1,1)],[-L*V(2,1),L*V(2,1)],'r');
        plot([-L*V(1,2);L*V(1,2)],[-L*V(2,2),L*V(2,2)],'r');
while button==1;
   [i,j,button]=ginput(1);
       [~, y] = ode45(@(t,y)A*y, [t0 tend], [i; j]); % startpunkt[i,j]
       plot(y(:,1),y(:,2), 'b');
end
```