Simulation of the Prey-Predator Model in MATLAB

Implement the prey-predator model, which is represented by a system of two first order ODEs in MATLAB.

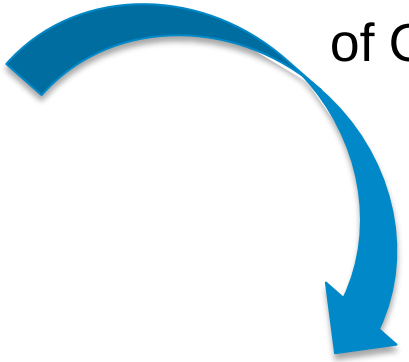
$$\dot{x}_1 = ax_1 - bx_1x_2$$
$$\dot{x}_2 = -dx_2 + cx_1x_2$$

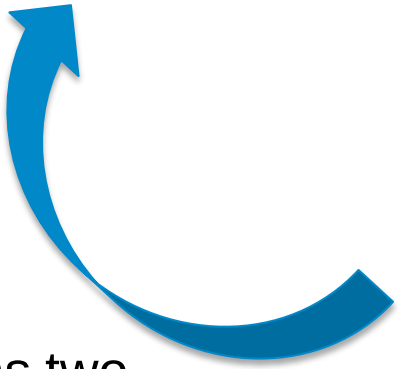
a=1, b=2, c=3, d=4

Simulation Setup

Main program (*.m-file):
- Definition of Simulation time (tspan)
- Definition of Initial Condions (x0)
- Call of Integrator and ODE function
- (Control of additional settings)
- Postprocessing

ODE-Solver calls system of ODES





ODE-Solver returns two arrays: solution *x* and time *t*

System of 1st order ODEs (*.m-file):
- Definition of first order ODES
- Definition of parameters

Syntax / Main Program

```
tspan=[0 20] %integration time
x0=[0;0.1]   %initial conditions
[t,x]=ode45(,NameOfFunction', tspan,x0)
```

Returned values

Choice of ODE Solver

Function containing 1st order ODE

Definition of Simulation time and initial conditions