



- 1 Use integration by parts two times to solve the integral

$$\int e^x \sin(x) dx$$

- 2 Use partial fraction decomposition to solve the integral

$$\int_2^3 \frac{x+1}{x(x-1)} dx$$

- 3 Solve the differential equation with initial values

$$\frac{dy}{dx} = ye^x, \text{ with } y_0 = 1, x_0 = 1$$

- 4 Let

$$\frac{dy}{dx} = (y-1)(y+1)$$

Find the points of equilibria and find out if they are stable or unstable.

- 5 Find the augmented matrix and use it to solve the linear system

$$\begin{aligned} x - y &= 1 \\ 2x + y &= -1 \end{aligned}$$

- 6 In this task we will consider the matrices

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 7 & 7 & 7 \\ 6 & 6 & 6 \end{bmatrix}, C = \begin{bmatrix} 2 & 3 \\ 4 & 1 \\ -1 & 3 \end{bmatrix}, D = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 4 \\ -1 & 1 & 1 \end{bmatrix}$$

- a) Compute $A + B$.
- b) Compute $A \cdot C$ and $C \cdot A$.
- c) If it exists, compute the inverse matrix of D .