

## Equations:

In-line equations or math symbols have dollar signs around them, e.g., the function  $u(t)$  satisfies  $u' = \lambda u$ .  
 Displayed equations without equation numbers can be made either with

$$\int_0^{\infty} f(x) dx$$

or with

$$\|A^{-1}\|_{\infty} = k \sum_{m=1}^N |(1 + k\lambda)^{N-m}|$$

To add an equation number, leave off the \* in the equation environment,

$$\sum_{j=1}^r a_{ij} = c_i, \quad i = 1, 2, \dots, r. \tag{1}$$

The label command lets you refer to this equation later as equation (1), or using the shorthand macro, (1).

Labels can be added to other numbered things like figure captions too.

## Equations lined up:

$$\begin{aligned} u''(t) &= f_u(u(t), t)u'(t) + f_t(u(t), t) \\ &= f_u(u(t), t)f(u(t), t) + f_t(u(t), t) \end{aligned}$$

Another example:

$$\begin{aligned} Y_1 &= U^n \\ Y_2 &= U^n + \frac{1}{2}kf(Y_1, t_n) \\ Y_3 &= U^n + \frac{1}{2}kf(Y_2, t_n + k/2) \\ Y_4 &= U^n + kf(Y_3, t_n + k/2) \\ U^{n+1} &= U^n + \frac{k}{6}[f(Y_1, t_n) + 2f(Y_2, t_n + k/2) \\ &\quad + 2f(Y_3, t_n + k/2) + f(Y_4, t_n + k)] \end{aligned}$$

## Vectors and matrices:

Here's a vector  $u \in \mathbb{R}^3$ :

$$u = \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}.$$

A linear system:

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}.$$

