

## Summary

- $F(x)$  is called an **antiderivative** of a function  $f(x)$  if  $F'(x) = f(x)$ .
- Any two derivatives of  $f(x)$  on an interval  $(a,b)$  differ by a constant.
- The general antiderivative is indicated by the indefinite integral:

$$\int f(x)dx = F(x) + C$$

## Integration formulas

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad n \neq -1$$

$$\int \sin(kx + b)dx = -\frac{1}{k} \cos(kx + b) + C \quad k \neq 0$$

$$\int \cos(kx + b)dx = \frac{1}{k} \sin(kx + b) + C \quad k \neq 0$$

$$\int e^{kx+b} dx = \frac{1}{k} e^{kx+b} + C \quad k \neq 0$$

$$\int \frac{dx}{x} = \ln|x| + C$$

## Solving differential equations

To solve a differential equation with initial condition  $y(x_0) = y_0$ , first find the general antiderivative  $y = F(x) + C$ . Then determine  $C$  using the initial condition information.