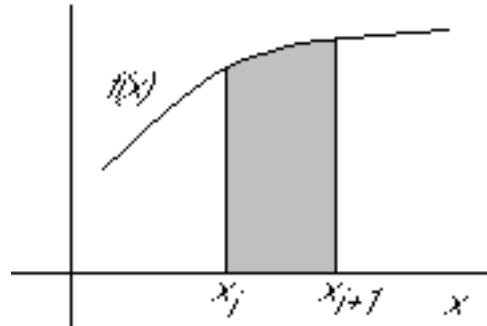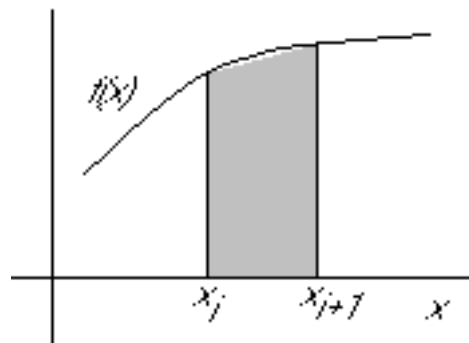# Introduction

Numerical integration using Newton formulae:

- can handle any function;

- simple;

- can handle measured data easily.
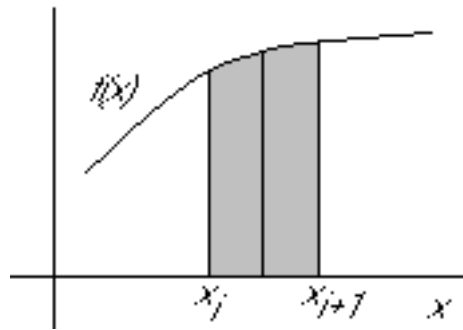
Trapezium rule for an interval from $x = x_i$ to x_{i+1}:

$$\int_{x_i}^{x_{i+1}} f(x)\,\mathrm{d}x \approx (x_{i+1} - x_i)\frac{f(x_i) + f(x_{i+1})}{2}$$

Simpson rule for an interval from $x = x_i$ to x_{i+1}:

$$\int_{x_i}^{x_{i+1}} f(x)\,\mathrm{d}x \approx (x_{i+1} - x_i)\frac{f(x_i) + 4f(x_{i+\frac{1}{2}}) + f(x_{i+1})}{6}$$

These rules are accurate if the interval from x_i to x_{i+1} is sufficiently small. To integrate over an interval that is not small, divide it into small ones, then integrate over each small interval and add the results.