

## Section 2: Mean values and general integration

### Exercise level 1

1. Find the mean value of the following functions.

(i)  $f(x) = x^3$  between  $x = 0$  and  $x = 1$

(ii)  $f(x) = \sqrt{x}$  between  $x = 0$  and  $x = 4$

(iii)  $f(x) = 1 - x^2$  between  $x = -1$  and  $x = 1$

(iv)  $f(x) = 1 - \frac{1}{x^2}$  between  $x = 1$  and  $x = 2$

(v)  $f(x) = x^2 + 1$  between  $x = -1$  and  $x = 2$

2. Find the following integrals.

(i)  $\int \frac{1}{\sqrt{4-x^2}} dx$

(ii)  $\int \frac{1}{\sqrt{1-4x^2}} dx$

(iii)  $\int \frac{1}{\sqrt{x^2-4}} dx$

(iv)  $\int \frac{1}{\sqrt{4x^2-1}} dx$

(v)  $\int \frac{1}{\sqrt{4+x^2}} dx$

(vi)  $\int \frac{1}{\sqrt{1+4x^2}} dx$

(vii)  $\int \frac{1}{4+x^2} dx$

(viii)  $\int \frac{1}{1+4x^2} dx$

(ix)  $\int \frac{1}{4-x^2} dx$

(x)  $\int \frac{1}{1-4x^2} dx$