

3.2) The mean value of a function

Worked example

Find the mean value of $f(x) = \frac{3}{\sqrt{2+5x}}$ over the interval $[4,7]$

Your turn

Find the mean value of $f(x) = \frac{4}{\sqrt{2+3x}}$ over the interval $[2,6]$

$$\frac{4}{3}(\sqrt{5} - \sqrt{2})$$

Worked example

Find the mean value of $f(x) = \frac{2 \sin x \cos x}{\cos 2x+3}$
over the interval $[0, \frac{\pi}{4}]$

Your turn

Find the mean value of $f(x) = \frac{\sin x \cos x}{\cos 2x+2}$ over
the interval $[0, \frac{\pi}{2}]$

$$\frac{\ln 3}{2\pi}$$

Worked example

Find the mean value of $f(x) = \frac{5x}{2x^2-3x-2}$ over the interval $[1, 4]$

Your turn

Find the mean value of $f(x) = \frac{5x}{2x^2+3x-2}$ over the interval $[1, 5]$

$$\frac{1}{4} \ln \frac{49}{3}$$

Worked example

Find the mean value of $f(x) = \frac{1}{\sqrt{4-x}}$ over the interval $[0, 4]$

Your turn

Find the mean value of $f(x) = \frac{1}{\sqrt{2-x}}$ over the interval $[0, 2]$

$\sqrt{2}$

Worked example

$$f(x) = \frac{3}{1 - e^x}$$

- (a) Find the mean value of $f(x)$ over the interval $[\ln 2, \ln 10]$
- (b) Use your answer to part a to find the mean value over the interval $[\ln 2, \ln 10]$ of $f(x) + 5$.
- (c) Use geometric considerations to write down the mean value of $-f(x)$ over the interval $[\ln 2, \ln 10]$

Your turn

$$f(x) = \frac{4}{1 + e^x}$$

- (a) Find the mean value of $f(x)$ over the interval $[\ln 2, \ln 6]$
- (b) Use your answer to part a to find the mean value over the interval $[\ln 2, \ln 6]$ of $f(x) + 4$.
- (c) Use geometric considerations to write down the mean value of $-f(x)$ over the interval $[\ln 2, \ln 6]$

- (a) $\frac{4 \ln \frac{9}{7}}{\ln 3}$
- (b) $\frac{4 \ln \frac{9}{7}}{\ln 3} + 4$
- (c) $-\frac{4 \ln \frac{9}{7}}{\ln 3}$