



**Exercise 1.** A Ferris wheel with a radius of 10 m is rotating at a rate of one revolution every 2 minutes. How fast is a rider rising when his seat is 16 m above ground level?

**Exercise 2.** Estimate the following quantities.

a.  $\sqrt[3]{0.95}$

b.  $\cos 44^\circ$

**Exercise 3.** Find the absolute maximum and minimum values of  $f$  on the given interval.

a.  $f(t) = 2 \cos t + \sin 2t$ ,  $[0, \pi/2]$

b.  $f(x) = x\sqrt{x-x^2}$ ,  $[0, 1]$

c.  $f(x) = x^5 - x^3 + 2$ ,  $[-1, 1]$

**Exercise 4.** Is there a differentiable function  $f$  such that  $f(0) = -1$ ,  $f(2) = 4$  and  $f'(x) \leq 2$  for all  $x$ ?

**Exercise 5.** Show that the equation  $x^3 - 4x + 1 = 0$  has exactly three real solutions.

**Exercise 6.** Sketch the following curves, indicating all local or absolute maxima and minima, inflection points and asymptotes.

a.  $y = \sqrt[3]{x^2 - 1}$

b.  $y = \frac{1}{1 + e^{-x}}$

c.  $y = 1 + \frac{1}{x} + \frac{1}{x^2}$

**Exercise 7.** Evaluate the limit.

a.  $\lim_{x \rightarrow 0} \frac{e^{4x} - 1 - 4x}{x^2}$

b.  $\lim_{x \rightarrow 1^+} \left( \frac{x}{x-1} - \frac{1}{\ln x} \right)$

c.  $\lim_{x \rightarrow \pi/2^+} (\tan x)^{\cos x}$