
Exercise 1 (a) Find the slope of the tangent line to the curve $y = x - x^3$ at the point $(1, 0)$

(i) using Definition 1; $m = \lim_{x \to a} \frac{f(x)-f(a)}{x-a}$

(ii) using Equation 2; $m = \lim_{h \to 0} \frac{f(a+h)-f(a)}{h}$

(b) Find an equation of the tangent line in part (a).

(c) Graph the curve and the tangent line at $(1, 0)$.

Exercise 2 If a rock is thrown upward on the planet Mars with a velocity of 10 m/s, its height (in meters) after t seconds is given by $H(t) = 10t - 1.86t^2$.

(a) Find the velocity of the rock after one second.

(b) Find the velocity of the rock when $t = a$.

(c) When will the rock hit the surface?

(d) With what velocity will the rock hit the surface?

Exercise 3 Sketch the graph of a function g for which $g(0) = g(2) = g(4) = 0$, $g'(1) = g'(3) = 0$, $g'(0) = g'(4) = 1$, $g'(2) = -1$, $\lim_{x\to\infty} g(x) = \infty$, and $\lim_{x\to-\infty} g(x) = -\infty$.

Exercise 4 Let $f(x) = \frac{4}{\sqrt{1-x}}$. Find $f'(a)$.

Exercise 5 The table shows values of the viral load $V(t)$ in HIV patient 303, measured in RNA copies/mL, t days after ABT-538 treatment was begun.

t	4	8	11	15	22
$V(t)$	53	18	9.4	5.2	3.6

(a) Find the average rate of change of V with respect to t over each time interval: (i) $[8, 11]$; (ii) $[11, 15]$. What are the units?

(b) Estimate and interpret the value of the derivative $V'(11)$.

Exercise 6 The quantity (in pounds) of a gourmet ground coffee that is sold by a coffee company at a price of p dollars per pound is $Q = f(p)$.

(a) What is the meaning of the derivative $f'(8)$? What are its units?

(b) Is $f'(8)$ positive or negative? Explain.