

1. Find **the slope of the tangent** to each curve using the $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$.

a) $f(x) = \frac{2x-1}{x-4}$ at $(-1, \frac{3}{5})$

b) $f(x) = 4x^2 - 3x$ at $x = 2$

2. Find **the slope of the tangent** to each curve using the $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$.

a) $f(x) = \frac{3x}{3-2x}$ at $x = 3$

b) $f(x) = 6x^2 + 2x - 1$ at $x = 4$

3. The height, h , in metres of a sunflower plant is modelled by $h(t) = \frac{3t^2}{4+t^2}$, where t is the time, in months, after the seed is planted.

a) Determine **the average rate of change** of height between month 2 and month 6.

b) Determine **the instantaneous rate of change** of height after 4 months. (Use $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$)

4. A construction worker drops a bolt while working on a high-rise building 320 m above the ground. After t seconds, the bolt has fallen a distance of d metres, where $d(t) = 320 - 5t^2$, $0 \leq t \leq 8$. Find the instantaneous rate of change of the height of the bolt at 3 seconds, using $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$

Answers:

1. a) $\frac{-7}{25}$ b) 13 2. a) 1 b) 50 3. a) $\frac{3}{10}$ m/month b) $\frac{6}{25}$ m/month 4. decreasing by 30 m/s

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