

3. The rate of change of x^3 at $x = 2$ is

$$\begin{aligned}\lim_{h \rightarrow 0} \frac{(2+h)^3 - 2^3}{h} &= \lim_{h \rightarrow 0} \frac{8 + 12h + 6h^2 + h^3 - 8}{h} \\ &= \lim_{h \rightarrow 0} (12 + 6h + h^2) = 12.\end{aligned}$$