
Q 1. *Find the average rate of change of the function over the given intervals.*

$g(t) = 2 + \cos t$

a) $[0, \pi]$

b) $[-\pi, \pi]$

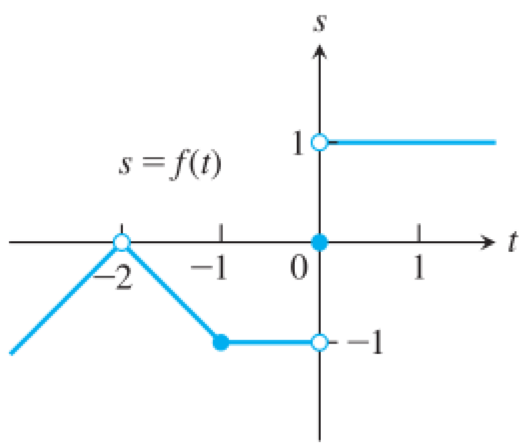
Q 2. *Use the method in example 3 to find*

a) *The slope of the curve at the given point P, and*

b) *an equation of the tangent line at P.*

$y = x^2 - 2x - 3,\ \ P(2, -3)$

Q 3. *For the function $f(t)$ graphed below,*



find the following limits or explain why they do not exist.

a) $\lim_{t\to -2} f(t)$ **b)** $\lim_{t\to -1} f(t)$ **c)** $\lim_{t\to 0} f(t)$ **d)** $\lim_{t\to -0.5} f(t)$

Q 4. *Find the following limits*

a) $\displaystyle\lim_{t\to -1} \frac{t^2 + 3t + 2}{t^2 - t - 2}$

b) $\displaystyle\lim_{v\to 1} \frac{\sqrt[3]{v} - 1}{v - 1}$

c) $\displaystyle\lim_{x\to 4} \frac{4 - x}{5 - \sqrt{x^2 + 9}}$

d) $\displaystyle\lim_{x\to 0} \frac{1 + x + \sin x}{3\cos x}$

Q 5. *If $2 - x^2 \le g(x) \le 2\cos x$ for all x, find $\lim_{x\to 0} g(x)$*

Q 6. *Suppose that* $g(x) \leq f(x) \leq h(x)$ *for all* $x \neq 2$ *and assume that*

$$\lim_{x\to 2} g(x) = \lim_{x\to 2} h(x) = -5$$

Can we conclude anything about the values of f, g *and* h *at* $x = 2$*? Could* $f(2) = 0$*? Could* $\lim_{x\to 2} f(x) = 0$*? Give reasons for your answers.*

Q 7. *If* $\lim\limits_{x\to 0} \dfrac{f(x)}{x^2} = 1$*, find*

a) $\lim\limits_{x\to 0} f(x)$ **b)** $\lim\limits_{x\to 0} \dfrac{f(x)}{x}$.

Q 8. *For the limit*

$$\lim_{x\to 2} \frac{x^2-4}{x-2} = 4,$$

find a $\delta > 0$ *that works for* $\varepsilon = 0.5$ *That is, find a* $\delta > 0$ *such that*

$$\left| \frac{x^2-4}{x-2} - 4 \right| < 0.5 \qquad \textit{whenever} \qquad 0 < |x-2| < \delta$$

Q 9. *Prove the limit statements below:*

a) $\lim\limits_{x\to 3}(3x-7) = 2$

b) $\lim\limits_{x\to 2} f(x) = 4$ *if*

$$f(x) = \begin{cases} x^2, & x \neq 2 \\ 1, & x = 2 \end{cases}$$