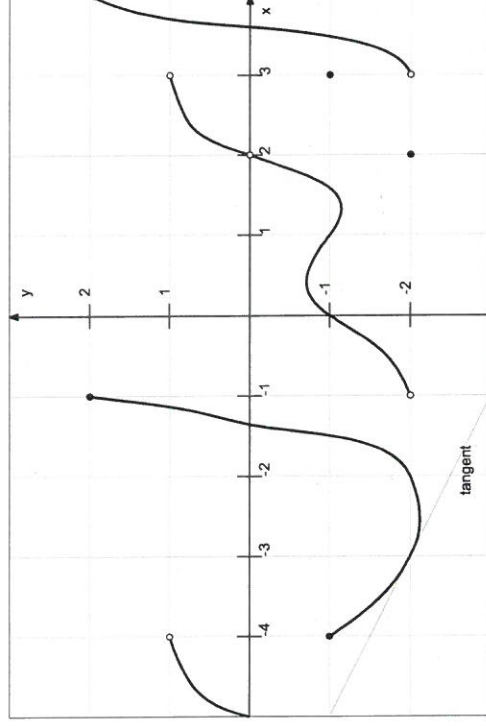


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| Name: <b>ANS CD</b> | A#: | Section: |
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- [9] 1. Let  $f$  be a function whose graph of  $y = f(x)$  is given below. Compute the following quantities or state that they do not exist.



- (a)  $f(2) = -2$
- (b)  $\lim_{x \rightarrow 3} f(x) = \text{DNE}$
- (c)  $\lim_{x \rightarrow 2} (x + f(x)) = 0$
- (d)  $\lim_{x \rightarrow 0^-} f(x) = -1$
- (e)  $\lim_{x \rightarrow -1^+} f(x) = -2$
- (f)  $\lim_{x \rightarrow 4^-} e^x f(x) = e^{-4}$
- (g) The average rate of change of  $f(x)$  over the interval  $[-3, -1]$   $= 2$
- (h) The instantaneous rate of change of  $f(x)$  when  $x = -3 = -\frac{1}{2}$
- (i) The equation of the secant line over the interval  $[-3, -1]$   $y = 3 + 2x$

[3] 2. Let  $f(x) = \begin{cases} x^2 + 1, & \text{if } x < 2 \\ e^{x-2}, & \text{if } x \geq 2 \end{cases}$ . Then

(a)  $\lim_{x \rightarrow 2^-} f(x) = \underline{5}$

(b)  $\lim_{x \rightarrow 1^+} f(x) = \underline{2}$

(c) The average rate of change of  $f$  over the interval  $[2, 4]$  is  $\underline{\frac{e^2 - 1}{2}}$

[8] 3. Compute the limit or state that it does not exist.

(a)  $\lim_{x \rightarrow -3} \frac{x+3}{\sqrt{x^2+x+3}-3}$

$$= \lim_{x \rightarrow -3} \frac{x+3}{\sqrt{x^2+x+3}-3} \cdot \frac{\sqrt{x^2+x+3}+3}{\sqrt{x^2+x+3}+3}$$

$$= \lim_{x \rightarrow -3} \frac{(x+3)(\sqrt{x^2+x+3}+3)}{(\sqrt{x^2+x+3}-3)(\sqrt{x^2+x+3}+3)}$$

$$= \lim_{x \rightarrow -3} \frac{(x+3)(\sqrt{x^2+x+3}+3)}{x^2+x-6} = \frac{(3+3)(3+3)}{(-3-2)} = \boxed{-\frac{6}{5}}$$

(b)  $\lim_{x \rightarrow 3^-} \frac{|x-3|}{x^2-x-6}$

$$= \lim_{x \rightarrow 3^-} \frac{3-x}{(x^2-3)(x+2)}$$

$$= \lim_{x \rightarrow 3^-} \frac{-1}{x+2} = \boxed{-\frac{1}{5}}$$