

Calculus I SI Worksheet

2.1-2.3 Tangent Lines & Limit Laws

1. The position of a vehicle over time t can be represented by the following equation:

$$S(t) = 3.6 + 1.9t - 0.2t^2$$

$$1.9 - 0.4t$$

a) Find the average velocity from $t=1$ to $t=4$

$$\begin{aligned} V_{avg} &= \frac{S(4) - S(1)}{4 - 1} = \frac{[3.6 + 1.9(4) - 0.2(4)^2] - [3.6 + 1.9(1) - 0.2(1)^2]}{3} \\ &= \frac{8 - 5.3}{3} = \boxed{0.9} \end{aligned}$$

b) Find the average velocity from $t=3$ to $t=4$

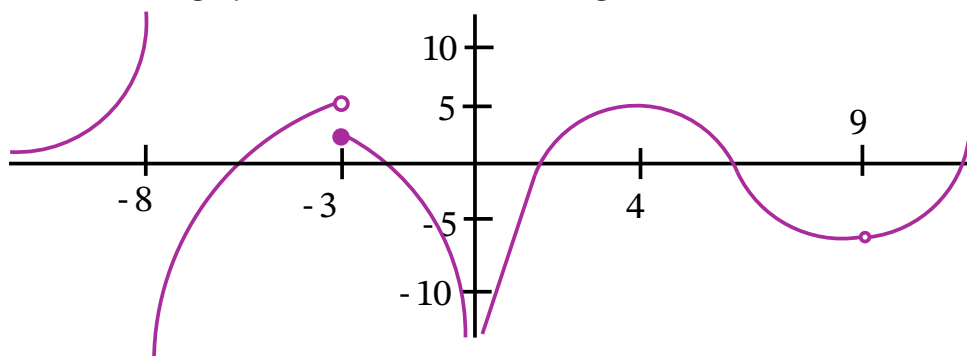
$$\begin{aligned} V_{avg} &= \frac{S(4) - S(3)}{4 - 3} = \frac{[3.6 + 1.9(4) - 0.2(4)^2] - [3.6 + 1.9(3) - 0.2(3)^2]}{1} \\ &= 8 - 7.5 = \boxed{0.5} \end{aligned}$$

c) Find the instantaneous velocity at $t=4$

t	$V_{avg} = \frac{S(4) - S(t)}{4 - t}$
3	0.5
3.5	0.4
3.9	0.32
4.1	0.28
4.5	0.2
5	0.1

$$V_{ins}(4) = 0.3$$

2. Use the bellow graph to evaluate the following limits



a) $\lim_{x \rightarrow -8^-} f(x)$

$= +\infty$

f) $\lim_{x \rightarrow -3^+} f(x)$

$= 2.5$

b) $\lim_{x \rightarrow -8^+} f(x)$

$= -\infty$

g) $\lim_{x \rightarrow 4} f(x)$

$= 5$

c) $\lim_{x \rightarrow -8} f(x)$

$= \text{DNE}$

h) $\lim_{x \rightarrow 9} f(x)$

$= -5$

d) $\lim_{x \rightarrow 0} f(x)$

$= -\infty$

i) $f(-3)$

$= 2.5$

e) $\lim_{x \rightarrow -3^-} f(x)$

$= 5$

j) $f(9)$

$= \text{DNE}$

3. Evaluate the following limits numerically.

a) $f(x) = \frac{x+3}{x-1}$

$\lim_{x \rightarrow 1^-} f(x) = -\infty$

$\lim_{x \rightarrow 1^+} f(x) = \infty$

x	$f(x)$
0.5	-7
0.9	-39
0.99	-399
0.999	-3999
1	DNE

x	$f(x)$
1	DNE
1.001	4001
1.01	401
1.1	41
1.5	9

b) $f(x) = \frac{x^2+x-6}{x-2}$

$\lim_{x \rightarrow 2} f(x) = 5$

x	$f(x)$
1.9	4.4
1.99	4.99
1.999	4.999
2	DNE
2.001	5.001
2.01	5.01
2.1	5.1