

Abdon Morales

Textbook HW02

2.1

9/6/2023

Question #6

a

I. [1, 2]

$$\frac{(10(2) - 1.86(2)^2) - (10(1) - 1.86(1)^2)}{2-1} = \frac{(20 - 7.44) - (10 - 1.86)}{2-1}$$

$$\frac{12.56 - 8.14}{2-1} = \frac{4.42}{1} = 4.42 \text{ m/s}$$

II. [1, 1.5]

$$\frac{(10(1.5) - 1.86(1.5)^2) - (10(1) - 1.86(1)^2)}{1.5-1} = \frac{(15 - 11.85) - (10 - 1.86)}{1.5-1}$$

$$\frac{10.815 - 8.14}{1.5-1} = \frac{2.675}{0.5} = 5.35 \text{ m/s}$$

III. [1, 1.1]

$$\frac{(10(1.1) - 1.86(1.1)^2) - (10(1) - 1.86(1)^2)}{1.1-1} = \frac{(11 - 2.2506) - (10 - 1.86)}{1.1-1}$$

$$\frac{8.74 - 8.14}{1.1-1} = \frac{0.6}{0.1} = 6 \text{ m/s}$$

IV. [1, 1.01]

$$\frac{(10(1.01) - 1.86(1.01)^2) - (10(1) - 1.86(1)^2)}{1.01-1} = \frac{(10.1 - 1.897) - (10 - 1.86)}{1.01-1}$$

$$\frac{8.203 - 8.14}{1.01-1} = \frac{0.063}{0.01} = 6.3 \text{ m/s}$$

V. [1, 1.001]

$$\frac{(10(1.001) - 1.86(1.001)^2) - (10(1) - 1.86(1)^2)}{1.001-1} = \frac{(10.001 - 1.8637) - (10 - 1.86)}{1.001-1}$$

$$\frac{8.1963 - 8.14}{1.001-2} = \frac{0.0063}{0.001} = 6.3 \text{ m/s}$$

Question #6

b. As it approaches 1,

$$\frac{(10(1+h) - 1.86(1+h)^2) - (8.14)}{h}$$

$$\hookrightarrow \frac{(10 + 10h - 1.86(h^2 + 2h + 1)) - (8.14)}{h}$$

$$\frac{(10 + 10h - 1.86h^2 - 3.72h - 1.86) - (8.14)}{h}$$

$$\lim_{h \rightarrow 0} \frac{-1.86h^2 + 6.28h + 8.14 - 8.14}{h + 1}$$

$$= \frac{-1.86h^2 + 6.28h}{h^2 + 2h + 1}$$

$$l_v = -1.86h + 6.28$$

$$-1.86(0) + 6.28$$

$$\boxed{6.28 \text{ m/s}}$$

Question 45

$$\lim_{x \rightarrow 0.5^-} \frac{2x-1}{|2x^3-x^2|} \Rightarrow \frac{2x-1}{|2x^3-x^2|} \rightarrow \frac{(2x-1)}{x^2-(2x+1)}$$

\downarrow

$$\frac{1}{x^2(2x-1)}$$

$$(x^2 | 2x-1) \quad (=)$$

$$\downarrow$$

$$x^2 - (2x+1)$$

$\frac{-9}{1} = \boxed{-9}$

Question 44

$$\lim_{x \rightarrow 1} \frac{|x+1|}{2x+8}$$

\Rightarrow

$$\lim_{x \rightarrow 1^-} \frac{-(x+1)}{2(x+1)} = \boxed{-\frac{1}{2}}$$

$$\lim_{x \rightarrow 1^+} \frac{(x+1)}{2(x+1)} = \boxed{\frac{1}{2}}$$

$\therefore \boxed{\text{DNE}}$

Additional Problem #1

a. $32t - 16t^2$

$$\frac{(32(2+h) - 16(2+h)^2) - (32(2) - 16(2)^2)}{2+h-2}$$

$$\frac{-32h - 32}{2+h-2}$$

$$\boxed{-16h - 32}$$

b. $t=2 = -32 \text{ ft/sec}$

Question #51 - 2.2

$$m = \frac{m_0}{\sqrt{1-v^2/c^2}}, \text{ what happens as } v \rightarrow c$$

As velocity approaches the speed of light from the left, the mass of the particle approaches ∞

$m \rightarrow \infty$

225

h + 2

h h² 2h

+2 2h 1

h² 4h 9

Q51

Abdon Morales Jr

Textbook Homework
02 - 2.3

9/6/2023

a. $g(x) = \frac{x^2 + x - 6}{|x-2|}$

$$x-3 \quad x-2$$

i. $\lim_{\substack{x \rightarrow 2^+ \\ \nearrow}} \frac{x^2 + x - 6}{|x-2|} = \frac{(x-2)(x+3)}{|x-2|} = \frac{\cancel{(x-2)}(x+3)}{\cancel{|x-2|}} = \frac{x+3}{\cancel{x-2}} \quad \begin{array}{l} \boxed{2+3=5} \leftarrow \boxed{(x+3)} \\ \cancel{x-2} \end{array}$

ii. $\lim_{\substack{x \rightarrow 2^- \\ \nearrow}} \frac{x^2 + x - 6}{|x-2|} = \frac{(x-2)(x+3)}{|x-2|} = \frac{\cancel{(x-2)}(x+3)}{\cancel{|x-2|}} = \frac{x+3}{-1} \quad \begin{array}{l} \frac{2+3}{-1} = \boxed{-5} \\ \cancel{x-2} \end{array}$

$$\frac{5}{-1} = \boxed{-5}$$

b. $\lim_{x \rightarrow 2} g(x) \rightarrow \frac{(x-3)}{-1} \neq \frac{(x+3)}{1}$ so NO; DNE

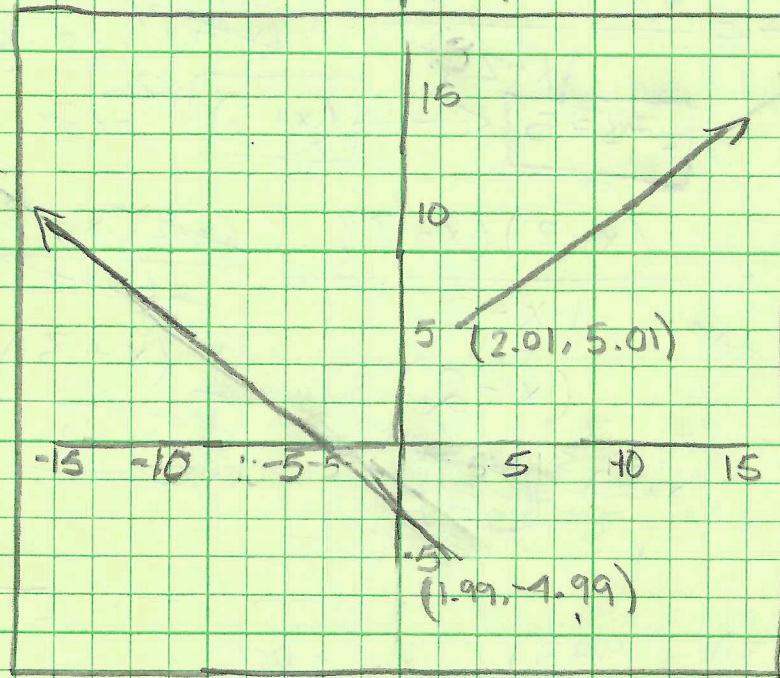
$\rightarrow \begin{bmatrix} \lim_{x \rightarrow 2^+} = 5 \\ \lim_{x \rightarrow 2^-} = 5 \end{bmatrix} = \text{DNE}$

$$\begin{array}{r} x-2 \\ x^2 - 2x \\ + \\ 3x - 6 \\ \hline x^2 + x - 6 \end{array}$$

Question 51c

C

$$g(x) = \frac{x^2 + x - 6}{|x-2|}$$



Graph $g(x)$