

Q51

Abdon Morales Jr

Textbook Homework
02 - 2.3

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

i. $\lim_{\substack{x \rightarrow 2^+ \\ \nearrow (x-2)}} \frac{x^2 + x - 6}{|x-2|} = \frac{(x-2)(x+3)}{|x-2|} = \frac{\cancel{(x-2)}(x+3)}{\cancel{|x-2|}} = \frac{x+3}{1} = \boxed{2+3=5}$

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

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

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

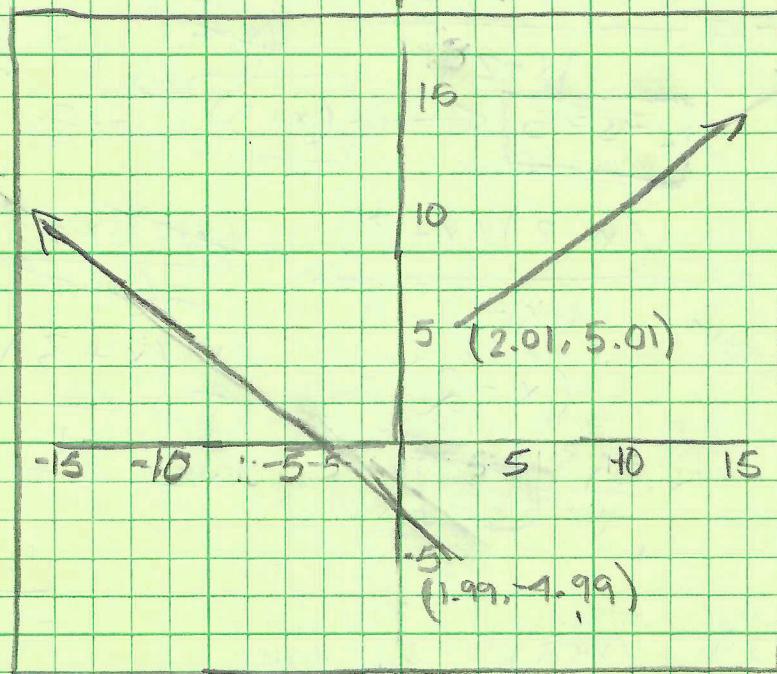
$\rightarrow \left[\begin{array}{l} \lim_{x \rightarrow 2^+} = 5 \\ \lim_{x \rightarrow 2^-} = 5 \end{array} \right] = \text{DNE}$

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

Question 51c

c

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



Graph $g(x)$

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

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

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

$\frac{1}{x^2}$
 $\frac{-1}{4}$
 $\frac{-1}{4} = \boxed{-4}$

Question 49

$$\lim_{x \rightarrow 4} \frac{|x+1|}{2x+8} \rightarrow \begin{cases} \lim_{x \rightarrow 4^-} \frac{-(x+1)}{2(x+1)} = \boxed{-\frac{1}{2}} \\ \lim_{x \rightarrow 4^+} \frac{(x+1)}{2(x+1)} = \boxed{\frac{1}{2}} \end{cases} \therefore \boxed{\text{DNE}}$$

Additional Problem #1

a.

$32t - 16t^2$

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

$\underline{2+h-2} \quad \underline{-32h}$

$\underline{(64+64h+16h^2 - (64)-64)} = \underline{(64h+64)}$
 $\underline{2+h-2}$

$\boxed{-16h-32}$

b.

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

Question #51 - 2.2

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

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

$m \rightarrow \infty$

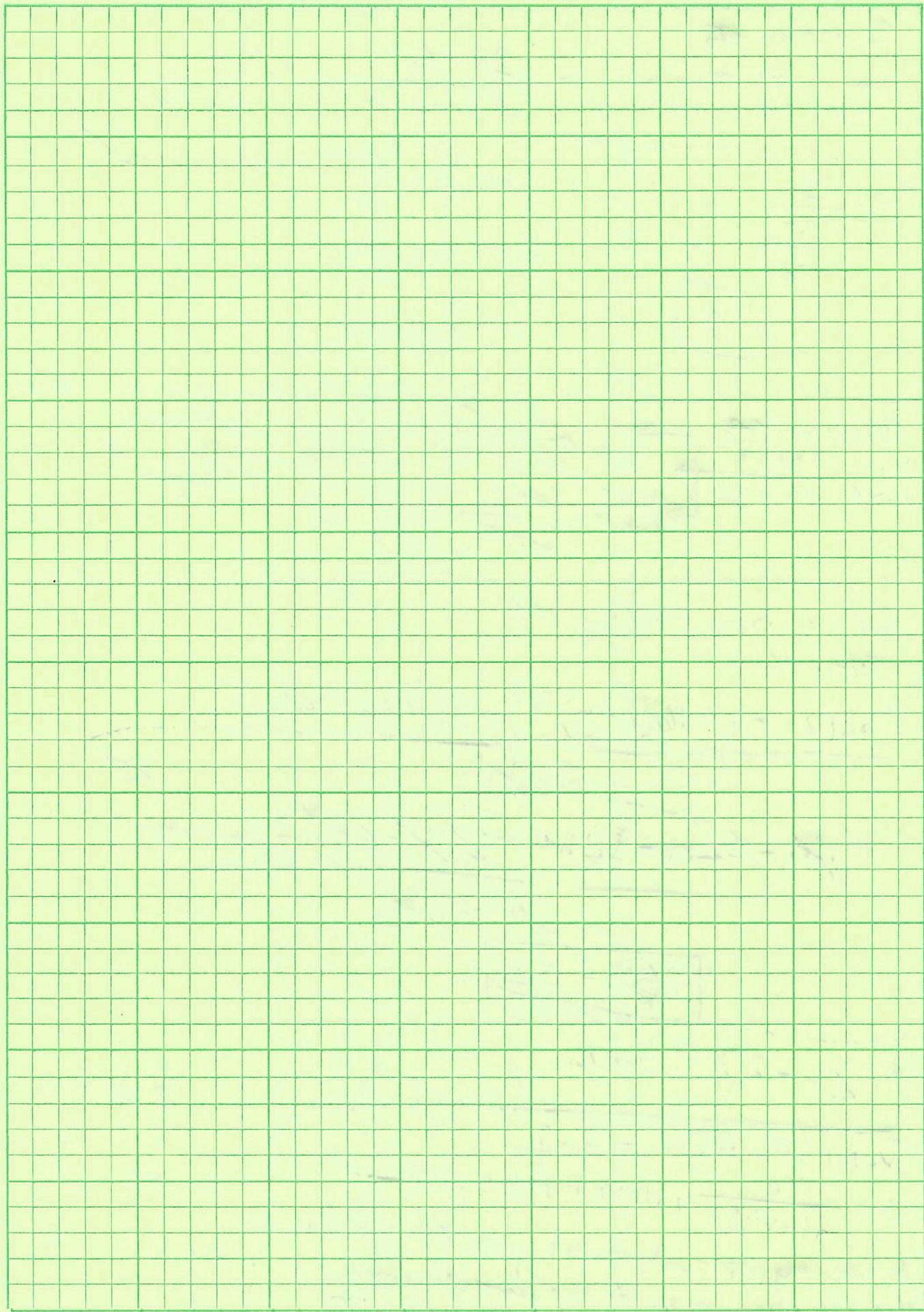
$22h$

$h+2$

$h h^2 2h$

$+2 2h 4$

$h^2 4h 4$



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]

$$\frac{(10(1.001) - 1.86(1.001)^2) - (10(1) - 1.86(1)^2)}{1.001-1} = \frac{(10.01 - 1.8637) - (10 - 1.86)}{1.001-1}$$

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

Question #6

b. As it approaches 1,

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

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

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

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

$$v = -1.86h + 6.28 \quad \begin{matrix} h^2 \\ -1.86(0) + 6.28 \\ +1 \end{matrix}$$

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



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