HW # 3 Solutions

2.8.26: $\lim_{\theta \to \pi^+} \frac{\theta^2}{\sin\theta} \left(= \frac{\pi^2}{0^-} \right) = -\infty$

θ is in 3^{rd} Quad if $\theta \to \pi^+$ which means $\sin\theta < 0$

2.8.42: V.A: $\lim_{x \to a^{\pm}} g(x) = \mp\infty$. But this never happens so no V.A.

H.A.: $\lim_{x\to\infty} g(x) = \lim_{x\to\infty} \frac{2x/\sqrt{x^2}}{\sqrt{\frac{x^2}{x^2} + \frac{5}{x^2}}} = \lim_{x\to\infty} \frac{2x/(x)}{\sqrt{1+5/x^2}} = \lim_{x\to\infty} \frac{2}{\sqrt{1+5/x^2}} = \frac{2}{\sqrt{1}} = 2$

$\sqrt{x^2} = |x|$

$\lim_{x\to-\infty} g(x) = \lim_{x\to-\infty} \frac{2x/\sqrt{x^2}}{\sqrt{x^2/x^2 + 5/x^2}} = \lim_{x\to-\infty} \frac{2x/(-x)}{\sqrt{1+5/x^2}} = \lim_{x\to-\infty} \frac{-2}{\sqrt{1+5/x^2}} = \frac{-2}{\sqrt{1}} = -2$

so $y = 2$, $y = -2$ are H.A.

2.9.44: $\lim_{x\to1^-} f(x) = 2 = f(1) = a+b$ $\quad 2 = a+b$

$\lim_{x\to2^-} f(x) = 2a+b = f(2) = 6$ $\quad 6 = 2a+b = a+(a+b) = a+2$

$\Rightarrow \boxed{a = 4} \Rightarrow \boxed{b = -2}$

Note we just needed only one sided limits but normally we need both sides

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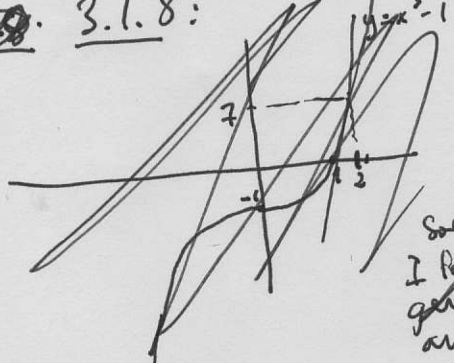
2.9.58: a) Dom $= [-\frac{3}{4}, \frac{3}{4}]$ Range $= \{-\frac{3}{4}, 0, \frac{3}{4}\}$

since $f(x) = \begin{cases} -3/4 & \text{if } x < 0 \text{ and } x \geq -3/4 \\ 0 & \text{if } x = 0 \\ 3/4 & \text{if } x > 0 \text{ and } x \leq 3/4 \end{cases}$

b) At $x = 0$, f is not cts.

c) $f(-3/4) = -3/4$, $f(0) = 0$, $f(3/4) = 3/4$ gives us fixed points. so $x = -\frac{3}{4}, 0, 3/4$ is the answer.

3.1.8:



~~c) m = slope = 6~~

~~d) slope of secant line thru (2,7) and $(2.01, (2.01)^3 - 1.0)$~~

~~=~~

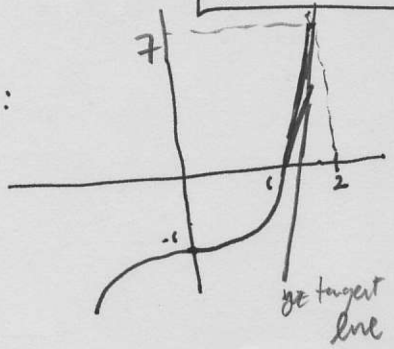
e) $m_{tan} = \lim_{h\to0} \frac{((x+h)^3-1) - (x^3-1)}{h} = \lim_{h\to0} \frac{x^3+3x^2h+3xh^2+h^3-x^3}{h}$

$= \lim_{h\to0} \frac{\cancel{h}(3x^2+3xh+h^2)}{\cancel{h}} = 3x^2$

Sorry I found general answer

HW 3 SOLUTIONS

3.1.8:



~~secant~~:

c) $m_{tan} = 12$

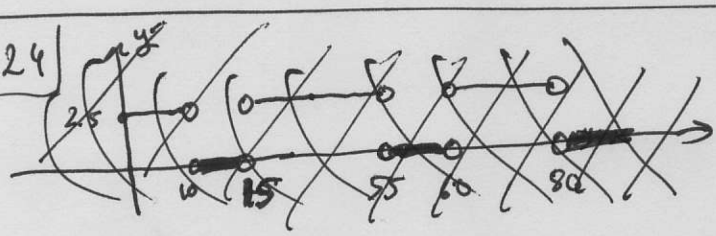
d) $m_{sec} = \dfrac{((2.01)^3 - 1) - (2^3 - 1))}{2.01 - 2}$

$= \dfrac{0.120601}{0.01} = 12.0601$

e) $m_{tan} = \lim_{h\to 0} \dfrac{f(2+h) - f(2)}{h} = \lim_{h\to 0} \dfrac{((2+h)^3 - 1) - (2^3 - 1)}{h}$

$= \lim_{h\to 0} \dfrac{12h + 6h^2 + h^3}{h} = \lim_{h\to 0} \dfrac{h(12 + 6h + h^2)}{h} = \lim_{h\to 0}(12 + 6h + h^2) = 12$ ///

3.1.24

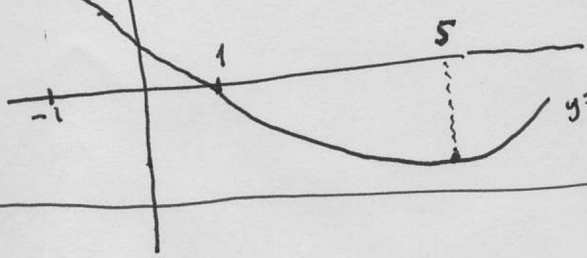


a) A.V $\approx \dfrac{84}{80}$

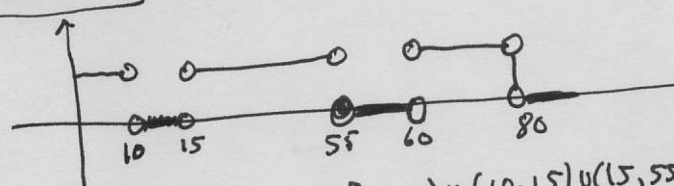
b) $V \approx \dfrac{60-12}{55-15} = 1.2$

c) made 2 stops. Each floor is $\frac{84}{7} = 12$ feet so it stopped at 1^{st} and 5^{th} floors before it stopped at 7^{th} floor.

3.2.40



3.2.42



Derivative exist on $[0,10) \cup (10,15) \cup (15,55) \cup (55,60) \cup (60,80) \cup (80,\infty)$