Name:	ID:	Sec: 14 22

MATH-101 Term-131 IN-Class-QUIZ-2

1) Find all the vertical and horizontal asymptotes $f(x)=\dfrac{\sqrt{16x^2+7}}{|x-3|}$

Domain of $f(x)$ is $\mathbb{R}-\{3\}$

$$\lim_{x\to 3^+} f(x) = \lim_{x\to 3^+} \frac{\sqrt{16x^2+7}}{(x-3)}$$

$$= \left(\lim_{x\to 3^+} \sqrt{16x^2+7}\right)\left(\lim_{x\to 3^+} \frac{1}{x-3}\right) = \left(\sqrt{9\times 16+7}\right)(+\infty)$$

$$= +\infty.$$

$\Rightarrow x=3$ is V.A

$$\lim_{x\to +\infty} \frac{\sqrt{16x^2+7}}{|x-3|} = \lim_{x\to +\infty} \frac{\sqrt{x^2}\sqrt{16+\frac{7}{x^2}}}{(x-3)} \quad (\text{since } x>3)$$

$$= \lim_{x\to +\infty} \frac{x\sqrt{16+7/x^2}}{x-3} \quad (\text{divid by } x)$$

$$= \lim_{x\to +\infty} \frac{\sqrt{16+7/x^2}}{1-\frac{3}{x}} = \frac{\sqrt{16+0}}{1-0} = 4$$

Also, $\displaystyle\lim_{x\to -\infty} f(x) = \lim_{x\to -\infty} \frac{|x|\sqrt{16+7/x^2}}{(3-x)} \quad (x\to -\infty)$

$$= \lim_{x\to -\infty} \frac{-x\sqrt{16+7/x^2}}{(3-x)} = \lim_{x\to -\infty} \frac{-\sqrt{16+\frac{7}{x^2}}}{\frac{3}{x}-1}$$

$$= \frac{-\sqrt{16+0}}{0-1} = \frac{-4}{-1} = 4$$

$\Rightarrow y=4$ is H.A

2) Let $f(x)=\sqrt{19-x}$. Find $\delta>0$ such that if $0<|x-10|<\delta$ then $|f(x)-3|<1$

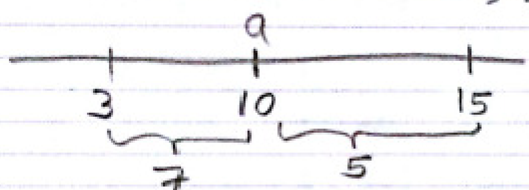
$f(x)=\sqrt{19-x}$, $L=3$, $a=10$, $\varepsilon=1$

$L+\varepsilon = 4 \to \sqrt{19-x} = 4 \Rightarrow 19-x = 16$

$\Rightarrow x = 3$

$L-\varepsilon = 2 \to \sqrt{19-x} = 2 \Rightarrow 19-x = 4$

$\Rightarrow x = 15$



$\Rightarrow \delta = \min\{7,5\}$

$= 5$