

Math 101 Quiz # 2

Name: _____ I.D. # _____ Section # _____ Serial # _____

1. Find each of the following limits:

$$\text{i) } \lim_{x \rightarrow \infty} \frac{x^2 - 3}{x^2 + 3} = 1$$

$$\text{ii) } \lim_{x \rightarrow \infty} \frac{x^2 - 5}{x^2 + 5} = 1$$

2. Find the horizontal and vertical asymptotes of the graph of the function

$$f(x) = \frac{\sqrt{3x^2 + 1}}{7x - 1}$$

$$7x - 1 = 0 \Rightarrow \boxed{x = \frac{1}{7}} \text{ is a V. A.}$$

$$\lim_{x \rightarrow \infty} f(x) = \lim_{x \rightarrow \infty} \frac{\sqrt{3x^2 + 1}}{7x - 1} = \lim_{x \rightarrow \infty} \frac{\sqrt{\frac{3x^2}{x^2} + \frac{1}{x^2}}}{\frac{7x}{x} - \frac{1}{x}} = \lim_{x \rightarrow \infty} \frac{\sqrt{3 + \frac{1}{x^2}}}{7 - \frac{1}{x}} = \frac{\sqrt{3}}{7}$$

$$\lim_{x \rightarrow -\infty} f(x) = \lim_{x \rightarrow -\infty} \frac{\sqrt{3x^2 + 1}}{7x - 1} = \lim_{x \rightarrow -\infty} \frac{\sqrt{3 + \frac{1}{x^2}}}{-7 + \frac{1}{x}} = -\frac{\sqrt{3}}{7}$$

\therefore The graph of $f(x)$ has H. A. $\boxed{y = \frac{\sqrt{3}}{7}}$ and $\boxed{y = -\frac{\sqrt{3}}{7}}$.

3. Use the definition to prove that $\lim_{x \rightarrow 2} x^2 - 1 = 3$

See Version B