Name: Richard

MATH 200 – Quiz 4

February 7, 2013

1. This quiz concerns the function $f(x) = \dfrac{x^2 - x - 6}{x^2 - 4x + 3}$. $= \dfrac{(x-\cancel{3})(x+2)}{(x-\cancel{3})(x-1)} = \dfrac{x+2}{x-1}$ Cancellation possible if $x \neq 3$

(a) Find the intervals on which $f(x)$ is continuous.

$f(x)$ is a continuous function divided by a continuous function, so it will be continous wherever its denominatior is not zero, i.e. $\boxed{(-\infty, 1) \cup (1, 3) \cup (3, \infty)}$

(b) Find the horizontal asymptotes (if any).

$\lim\limits_{x \to \infty} f(x) = \lim\limits_{x \to \infty} \dfrac{x^2 - x - 6}{x^2 - 4x + 3} = \dfrac{1}{1} = 1$ so $\boxed{\text{line } y = 1 \text{ is horizontal asymptote}}$

(c) Find the vertical asymptotes (if any).

Denominator of $f(x)$ is zero for $x = 1$ and $x = 3$ so these are the possible locations of vertical asymptotes.

Test $x=1$ $\lim\limits_{x \to 1^+} f(x) = \lim\limits_{x \to 1^+} \dfrac{x+2}{x-1}$ (approaches 3) (approaches 0, pos.) $= \infty$ $\boxed{\text{line } x = 1 \text{ is V. A.}}$

Test $x=3$ $\lim\limits_{x \to 3^+} f(x) = \lim\limits_{x \to 3^+} \dfrac{x+2}{x-1} = \dfrac{3+2}{3-1} = \dfrac{5}{2} \neq \pm\infty$ (no V. A. here)

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1. This quiz concerns the function $f(x) = \dfrac{x^2 - 4}{5x^2 - 10x}$. $= \dfrac{(x+2)(x-\cancel{2})}{5x(x-\cancel{2})} = \dfrac{x+2}{5x}$ Cancellation possible only if $x \neq 2$

(a) Find the intervals on which $f(x)$ is continuous.

$f(x)$ is a continuous function divided by a continuous function so it is continuous wherever its denominator is not zero, i.e. $\boxed{(-\infty, 0) \cup (0, 2) \cup (2, \infty)}$

(b) Find the horizontal asymptotes (if any).

$\lim\limits_{x \to \infty} f(x) = \lim\limits_{x \to \infty} \dfrac{x^2 - 4}{5x^2 - 10x} = \dfrac{1}{5}$ $\boxed{\text{So line } y = \tfrac{1}{5} \text{ is a H. A.}}$

(c) Find the vertical asymptotes (if any).

Denominator of $f(x)$ is zero when $x = 0$ and $x = 2$ so these are the possible locations of vertical asymptotes.

Test $x=0$ $\lim\limits_{x \to 0^+} f(x) = \lim\limits_{x \to 0^+} \dfrac{x+2}{5x}$ (Approaches $0+2=2$) (Approaches 0, pos.) $= \infty$ $\boxed{\text{line } x = 0 \text{ is V. A.}}$

Test $x=3$ $\lim\limits_{x \to 3^+} f(x) = \lim\limits_{x \to 3^+} \dfrac{x+2}{5x} = \dfrac{3+2}{5 \cdot 3} = \dfrac{5}{15} = \dfrac{1}{3}$ (no V. A. here)