

Graphing, Continuity, and Limits for Rational Functions

Sketch the function $f(x) = \frac{x^2 - x - 6}{x^2 + x - 12}$ and complete the following:

$f(x)$ has a 1) vertical asymptote at $x =$ _____

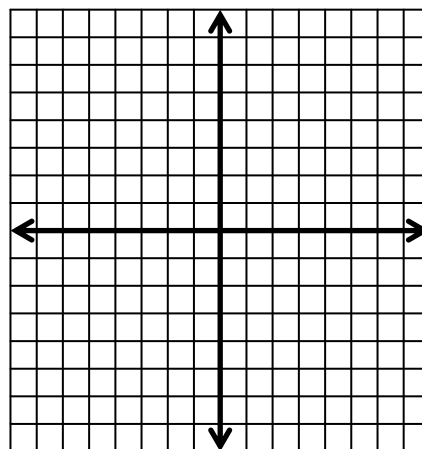
2) horizontal asymptote of $y =$ _____

3) x – intercept of _____

4) y – intercept of _____

5) removable discontinuity at $x =$ _____

and a 6) non-removable discontinuity at $x =$ _____



Evaluate the following:

7) $f(-4) =$ _____ 8) $f(-2) =$ _____ 9) $f(0) =$ _____ 10) $f(3) =$ _____

Evaluate the following limits or state “does not exist”

11) $\lim_{x \rightarrow -2} f(x) =$ _____

16) $\lim_{x \rightarrow -4^-} f(x) =$ _____

12) $\lim_{x \rightarrow 0} f(x) =$ _____

17) $\lim_{x \rightarrow -4^+} f(x) =$ _____

13) $\lim_{x \rightarrow 3^-} f(x) =$ _____

18) $\lim_{x \rightarrow -4} f(x) =$ _____

14) $\lim_{x \rightarrow 3^+} f(x) =$ _____

19) $\lim_{x \rightarrow +\infty} f(x) =$ _____

15) $\lim_{x \rightarrow 3} f(x) =$ _____

20) $\lim_{x \rightarrow -\infty} f(x) =$ _____

Answer Key

Graphing, Continuity, and Limits for Rational Functions

Sketch the function $f(x) = \frac{x^2 - x - 6}{x^2 + x - 12}$ and complete the following:

$$f(x) = \frac{x^2 - x - 6}{x^2 + x - 12} = \frac{(x-3)(x+2)}{(x+4)(x-3)} = \frac{(x+2)}{(x+4)}, \text{ for } x \neq 3$$

$f(x)$ has a 1) vertical asymptote at $x = \underline{-4}$

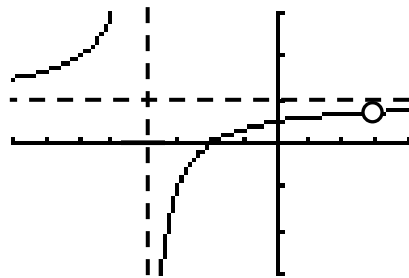
2) horizontal asymptote of $y = \underline{1}$

3) x – intercept of $\underline{-2}$

4) y – intercept of $\underline{1/2}$

5) removable discontinuity at $x = \underline{3}$

and a 6) non-removable discontinuity at $x = \underline{-4}$



Evaluate the following:

7) $f(-4) = \underline{\text{Undef.}}$ 8) $f(-2) = \underline{0}$ 9) $f(0) = \underline{1/2}$ 10) $f(3) = \underline{\text{Undef.}}$

Evaluate the following limits or state “does not exist”

11) $\lim_{x \rightarrow -2} f(x) = \underline{0}$

16) $\lim_{x \rightarrow -4^-} f(x) = \underline{+\infty}$

12) $\lim_{x \rightarrow 0} f(x) = \underline{1/2}$

17) $\lim_{x \rightarrow -4^+} f(x) = \underline{-\infty}$

13) $\lim_{x \rightarrow 3^-} f(x) = \underline{5/7}$

18) $\lim_{x \rightarrow -4} f(x) = \underline{\text{D.N.E.}}$

14) $\lim_{x \rightarrow 3^+} f(x) = \underline{5/7}$

19) $\lim_{x \rightarrow +\infty} f(x) = \underline{1}$

15) $\lim_{x \rightarrow 3} f(x) = \underline{5/7}$

20) $\lim_{x \rightarrow -\infty} f(x) = \underline{1}$

(Form A)