Class Drill 3: Guessing Limits by Substituting in Numbers

Without using a calculator, answer the following questions about the function

\[ f(x) = \frac{x^2 - 6x + 5}{x^2 - 8x + 15} \]

Part 1: Function Values

(1) Factor \( f \). (Check your factorizations by multiplying.)

(2) Are you allowed to cancel factors in the factored form of \( f \)? Explain why you think you are allowed to cancel, or why you are not.

(3) Find \( f(1) \) by substituting \( x = 1 \) into the factored version of \( f \).

(4) Find \( f(3) \) by substituting \( x = 3 \) into the factored version of \( f \).

(5) Find \( f(5) \) by substituting \( x = 5 \) into the factored version of \( f \).

Part 2: Limits

Using the factored form of \( f \), compute the following values and guess the limits.

Guessing the limit at \( x = 5 \).
(Just leave answers as an expression ready to type into a calculator.)

(11) \( f(5.1) = \)

(12) \( f(5.01) = \)

(13) \( f(5.001) = \)

(15) \( \lim_{x \to 5^+} f(x) = \)
(16) \( f(4.9) = \)

(17) \( f(4.99) = \)

(18) \( f(4.999) = \)

(20) Guess \( \lim_{x \to 5^-} f(x) = \)

(21) Guess \( \lim_{x \to 5} f(x) = \)

**Guessing the limit at \( x = 3 \). (Simplify your answers.)**

(11) \( f(3.1) = \)

(12) \( f(3.01) = \)

(13) \( f(3.001) = \)

(15) Guess \( \lim_{x \to 3^+} f(x) = \)

(16) \( f(2.9) = \)

(17) \( f(2.99) = \)

(18) \( f(2.999) = \)

(20) Guess \( \lim_{x \to 3^-} f(x) = \)

(21) Guess \( \lim_{x \to 3} f(x) = \)