Class Activity for Fri Aug 26: Function Values and Limits for a Rational Function

Without using a calculator, answer the following questions about the functions.

$$f(x) = \frac{x^2 + 10x + 21}{x^2 = 5x + 6} = \frac{(x + 7)(x + 3)}{(x + 2)(x + 3)} \quad and \quad g(x) = \frac{x + 7}{x + 2}$$

Part 1: Function Values

(1) Find $f(-2)$ by substituting $x = -2$ into the factored version of f.

(2) Find $f(-3)$ by substituting $x = -3$ into the factored version of f.

(3) Find $f(-7)$ by substituting $x = -7$ into the factored version of f.

(4) Find $g(-2)$ by substituting $x = -2$ into the factored version of g.

(5) Find $g(-3)$ by substituting $x = -3$ into the factored version of g.

(6) Find $g(-7)$ by substituting $x = -7$ into the factored version of g.

(7) Is $\dfrac{(x + 7)(x + 3)}{(x + 2)(x + 3)} = \dfrac{x + 7}{x + 2}$ a true equation?

(8) Are $f(x)$ and $g(x)$ the same function? Explain.

Part 2: Limits

(9) Estimate $\lim_{x\to-3} f(x)$ using Section 1.1 Techniques. That is, compute these values:

$$f(-2.9) = \frac{\big((-2.9)+7\big)\big((-2.9)+3\big)}{\big((-2.9)+2\big)\big((-2.9)+3\big)} =$$

$$f(-2.99) = \frac{\big((-2.99)+7\big)\big((-2.99)+3\big)}{\big((-2.99)+2\big)\big((-2.99)+3\big)} =$$

$$f(-2.999) = \frac{\big((-2.999)+7\big)\big((-2.999)+3\big)}{\big((-2.999)+2\big)\big((-2.999)+3\big)} =$$

Estimate: $\lim_{x\to-3^+} f(x) =$

$$f(-3.1) = \frac{\big((-3.1)+7\big)\big((-3.1)+3\big)}{\big((-3.1)+2\big)\big((-3.1)+3\big)} =$$

$$f(-3.01) = \frac{\big((-3.01)+7\big)\big((-3.01)+3\big)}{\big((-3.01)+2\big)\big((-3.01)+3\big)} =$$

$$f(-3.001) = \frac{\big((-3.001)+7\big)\big((-3.001)+3\big)}{\big((-3.001)+2\big)\big((-3.001)+3\big)} =$$

Estimate: $\lim_{x\to-3^-} f(x) =$

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