2-1 Applied Calculus Solutions

Monday, May 30, 2016 3:25 PM

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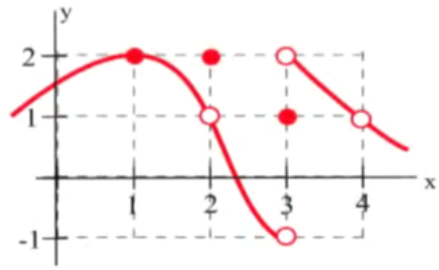
1. Use the graph to determine the following limits.

(a) $\lim_{x\to 1} f(x)$ (b) $\lim_{x\to 2} f(x)$

(c) $\lim_{x\to 3} f(x)$ (d) $\lim_{x\to 4} f(x)$



(1a) limit = 2
(1b) limit = 1
(1c) limit does not exist
(1d) limit = 1

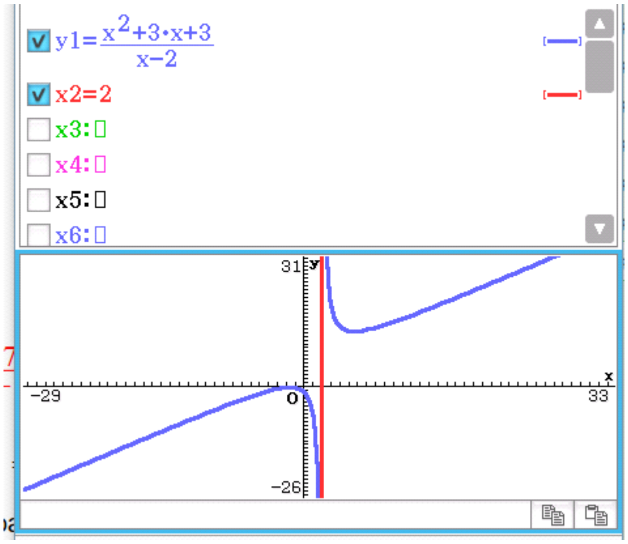
5. Evaluate (a) $\lim_{x\to 1} \dfrac{x^2+3x+3}{x-2}$ (b) $\lim_{x\to 2} \dfrac{x^2+3x+3}{x-2}$

(5a)

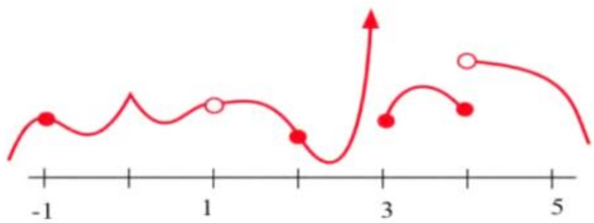
$$\lim_{x\to 1} \frac{x^2+3x+3}{x-2} = \frac{1^2+3(1)+3}{1-2} = \frac{1+3+3}{-1} = \frac{7}{-1} = \boxed{-7}$$

(5b) As $x \to 2$, the numerator approaches $2^2+(3)(2)+3 = 4+6+3 = 13$.
However the denominator approaches 0.
Thus the rational function approaches $-\infty$ and approaches ∞ from the right.

Therefore the limit does not exist.



7. At which points is the function shown discontinuous?



The function is discontinuous at $x = 1, 3$, and 4.

9. Find at least one point at which each function is not continuous and state which of the 3 conditions in the definition of continuity is violated at that point.

(a) $\dfrac{x+5}{x-3}$

The function is not continuous at $x = 3$.

At $x = 3$, the denominator is zero, and so the function is not defined.
Furthermore, $\lim_{x \to 3} \frac{x+5}{x-3}$ does not exist, because the function approaches $-\infty$ from the left and ∞ from the right.

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These solutions were created by Donald R. Goral from exercises in *Applied Calculus, Edition 1*
by Shana Calaway, Dale Hoffman, David Lippman