Answer on Question #74504 – Math – Calculus

Given: $f(x)=\begin{cases}3-kx; 1\le x<2\\ \dfrac{x^2}{4}-3; x\ge 2\end{cases}$

To Find: Find the value of **"k"** so that the function is continuous at x=2by using definition.

Solution: The given function is $f(x)=\begin{cases}3-kx; 1\le x<2\\ \dfrac{x^2}{4}-3; x\ge 2\end{cases}$

The given function is continuous in [1, 2) and in [2, ∞), since in both interval function is a polynomial and polynomials are continuous everywhere. Now, we have to check continuity at x=2, if function is continuous at x=2 then it is continuous everywhere.

For continuity, we have

$$LHL = RHL$$

$$\therefore LHL = \lim_{x\to 2^+} f(x)$$

$$= \lim_{x\to 2^+}\left(\frac{x^2}{4}-3\right)$$

$$= \left(\frac{2^2}{4}-3\right) = -2$$

& $RHL = \lim_{x\to 2^-} f(x)$

$$= \lim_{x\to 2^-}(3-kx)$$

$$= (3-2k)$$

Hence $\quad (3-2k) = -2$

$$\Rightarrow \quad -2k = -5$$

$$\Rightarrow \quad k = 5/2$$

So, for *k=5/2,* f(x) is continuous.

If k=5/2, then f(x) is continuous everywhere on [1, ∞).

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