Answer on Question #85528 – Math – Calculus

Question

If f(x)=(4x^2-7x-2)/(x-2) , x not equal to 2, find a z>0 such that |f(x)-9|<(1/100) for 0<|x-2|<z. Hence, show that lim x tends to 2 f(x)= 9.

Solution

Let $f(x) = \frac{4x^2-7x-2}{x-2}$. If x is not equal to 2, then $f(x) = \frac{4x^2-7x-2}{x-2} = \frac{(x-2)(4x+1)}{x-2} = 4x + 1$.
Therefore, $|f(x) - 9| = |4x + 1 - 9| = |4x - 8| = 4 * |x - 2|$.
If $|f(x) - 9| = 4 * |x - 2| < 0.01$, then $|x - 2| < \frac{0.01}{4}$. Hence, z = 0.0025.
Therefore, if $z = \frac{d}{4}$, then from the fact that $|x-2| < z$, it follows that $|f(x) -9| < d$.
It means that $\lim_{x\to 2} \frac{4x^2-7x-2}{x-2} = 9$.

Answer:

z = 0.0025