

## Answer on Question #66202 – Math – Calculus

### Question

Show that  $\lim_{x \rightarrow \infty} \left( \frac{2}{x-3} \right) = 0$

### Solution

Dividing the numerator and denominator in

$$\lim_{x \rightarrow \infty} \left( \frac{2}{x-3} \right)$$

by  $x$  we obtain

$$\lim_{x \rightarrow \infty} \left( \frac{2 \frac{1}{x}}{1 - \frac{3}{x}} \right)$$

Introducing a new variable

$$u = \frac{1}{x}, \text{ so } u \rightarrow 0 \text{ as } x \rightarrow \infty,$$

evaluate

$$\begin{aligned} \lim_{x \rightarrow \infty} \left( \frac{2 \frac{1}{x}}{1 - \frac{3}{x}} \right) &= \lim_{u \rightarrow 0} \left( \frac{2u}{-3u + 1} \right) = \frac{\lim_{u \rightarrow 0} 2u}{\lim_{u \rightarrow 0} (-3u + 1)} = \frac{2 \lim_{u \rightarrow 0} u}{-3 \lim_{u \rightarrow 0} u + 1} = \frac{2 \cdot 0}{-3 \cdot 0 + 1} = \frac{0}{-0 + 1} \\ &= 0 \end{aligned}$$

We get

$$\lim_{x \rightarrow \infty} \left( \frac{2}{x-3} \right) = 0$$

**Answer:** 0.