PRINT Your Name:_____

Find the limit of the sequence whose n^{th} term is $a_n = n \sin \frac{3}{n}$.

We compute

$$\lim_{n \to \infty} a_n = \lim_{n \to \infty} n \sin \frac{3}{n} = \lim_{n \to \infty} \frac{\sin \frac{3}{n}}{\frac{1}{n}}.$$

The top and the bottom both go to zero; so we may apply L'Hopital's rule to conclude that

$$\lim_{n \to \infty} a_n = \lim_{n \to \infty} \frac{\frac{-3}{n^2} \cos \frac{3}{n}}{\frac{-1}{n^2}} = \lim_{n \to \infty} 3 \cos \frac{3}{n} = 3.$$

The sequence whose n^{th} term is $a_n = n \sin \frac{3}{n}$ converges to 3.