

Answer on Question #58321– Math – Complex Analysis

Question

$$\lim_{z \rightarrow \infty} (2z^2 + 45z^2 + i)$$

Solution

$$\begin{aligned} \lim_{z \rightarrow \infty} (2z^2 + 45z^2 + i) &= \lim_{z \rightarrow \infty} (47z^2 + i) = \lim_{z \rightarrow \infty} (47(x + iy)^2 + i) = \lim_{z \rightarrow \infty} (47(x^2 + 2xyi - y^2) + i) = \\ &= \lim_{z \rightarrow \infty} (47x^2 - 47y^2 + i(2xy + 1)) \end{aligned}$$

If $y = x$ then the limit is purely imaginary.

If $y = -\frac{1}{2x}$ then the limit is purely real.

Thus, the value of limit depends on the choice of subsequence, hence this function does not have a limit.