Given that

$a_n x^n + a_{n-1} x^{n-1} + \cdots a_1 x + a_0$ this polynomial

has Complex root with negative real part.

Now. $a_n \frac{d^n u}{dt^n} + a_{n-1} \frac{d^{n-1} u}{dt^{n-1}} + \cdots a_1 \frac{du}{dt} + a_0 u = 0$

Solution of above diff. eq^n is such as

$\frac{d}{dx} \equiv D$

$[a_n D^n + a_{n-1} D^{n-1} + \cdots a_1 D + a_0] u = 0$

A.E. $\quad a_n m^n + a_{n-1} m^{n-1} + \cdots a_1 m + a_0 = 0$

Since given that roots of this polynomial has complex roots ~~than~~ ~~set~~ such as

$-\alpha_1 \pm i\beta_1, \quad \alpha_2 \pm i\beta_2, \cdots \alpha_p \pm i\beta_p$

and solution corresponding to this

lim $\quad u(x) = e^{-\alpha_1 x}[\cos\beta_1 x + i\sin\beta_1 x] + \cdots$

$e^{-\alpha_p x}[\cos\beta_p x + i\sin\beta_p x]$

$$\lim_{x \to \infty} u(x) = e^{-\infty} \left(\qquad \right) + \cdots \; e^{-\infty} \left(\qquad \right)$$

$$\boxed{\lim_{x \to \infty} u(x) = 0}$$