$$
\begin{aligned}
P(Z_n = 0) &= 1 - P(Z_n \geq 1) \\
&= 1 - \sum_{k=1}^{\infty} P(Z_n = k) \\
&\geq 1 - \sum_{k=1}^{\infty} k P(Z_n = k) \\
&= 1 - \sum_{k=0}^{\infty} k P(Z_n = k) \\
&= 1 - E(Z_n) = 1 - \mu^n
\end{aligned}
$$

$$
\lim_{n \to \infty} P(Z_n = 0) \geq \lim_{n \to \infty} (1 - \mu^n)
$$

$\mu \leq 1$ THEN

$$
\lim_{n} P(Z_n = 0) = 1
$$