$F(x) = \text{TrailingZeroes}(n)$

Let $f(x) = n$

$\therefore n = \frac{x}{5} + \frac{x}{25} + \frac{x}{125} + \cdots$

$n = x.\sum_{i=1}^{\infty} \frac{1}{5^i} = x. \sum_{i=1}^{\infty} \left(\frac{1}{5}\right)^i$

$\because \sum_{i=1}^{\infty} r^i = \frac{r}{1-r}$

$\therefore \sum_{i=1}^{\infty} \left(\frac{1}{5}\right)^i = \frac{(1/5)}{1-(1/5)} = \frac{1}{4}$

$\therefore \sum_{i=1}^{m} \left(\frac{1}{5}\right)^i \leq \frac{1}{4}$

Because we loop until $\frac{x}{5^i} < 1$

$\therefore n \leq x\left(\frac{1}{4}\right)$

$\therefore \boxed{x \geq 4n}$

$\therefore$ Low $= 4*n$

$\text{high} = 5 * n$ (why ?!)

$\Downarrow$ This means

$x \leq 5n$

Proof:

assume $x > 5n$

$\Longrightarrow$ TrailingZeroes(x) is monotonus function which means

for all $x \leq y$

we have $f(x) \leq y$

so if $x > 5n$

$\therefore f(x) > f(5n)$

$\because f(x) = n$

$\therefore n > f(5n)$

$\therefore n > (5n) \cdot \sum_{i=1}^{m} \left(\frac{1}{5}\right)^i$

$n > 5n \left(\frac{1}{4}\right)$

$n > \frac{5}{4} n$ # contradiction

$\therefore \boxed{x \leq 5n}$