Unlucky Execution of UnsafeSequence.nextValue

A $\quad \boxed{\text{Value} \rightarrow 9} \longrightarrow \boxed{9+1 \rightarrow 10} \longrightarrow \boxed{\text{Value} = 10}$

B $\quad \longrightarrow \boxed{\text{Value} \rightarrow 9} \longrightarrow \boxed{9+1 \rightarrow 10} \longrightarrow \boxed{\text{Value} = 10}$

1. $S_n = T_1 / T_n$ and $T_n = T_s + (T_p / N)$

(a) $S_4 = T_1 / T_4$ ,

$T_4 = (0.10 * T_1 + (0.9/4) * T_1)$

$\therefore E_n = S_n / n \Rightarrow E_4 = S_4 / 4$

$= 3.077/4$

$\approx 0.768$

Hence $S_4 = \dfrac{T_1}{0.10T_1 + \frac{0.9}{4} T_1}$

$= \dfrac{1}{0.10 + \frac{0.9}{4}}$

$\approx 3.077$

(b) $S_8 = T_1 / T_8$ ,

$T_8 = (0.10 * T_1 + (0.9/8) * T_1)$

$\therefore E_n = S_n / n \Rightarrow E_8 = S_8 / 8$

$=$

$\approx 0.768$

Hence $S_8 = \dfrac{T_1}{0.10T_1 + \frac{0.9}{8} T_1}$

$= \dfrac{1}{0.10 + \frac{0.9}{8}}$

$\approx 4.706$

(c) $S_{16} = T_1 / T_{16}$ ,

$T_{16} = (0.10 * T_1 + (0.9/16) * T_1)$

$\therefore E_n = S_n / n \Rightarrow E_4 = S_4 / 4$

$= 3.077/4$

$\approx 0.768$

Hence $S_{16} = \dfrac{T_1}{0.10T_1 + \frac{0.9}{16} T_1}$

$= \dfrac{1}{0.10 + \frac{0.9}{16}}$

$\approx 6.4$

2.

(a) $S_8 = T_1 / T_{4\prime}$

$= T_1 / ((1-0.2)T_1 + \left[\frac{0.2}{8}\right] T_1)$

$= 1 / (0.8) + \frac{0.2}{8})$

$\approx$ 1.212

(b) $S_4 = T_1 / T_4$

$= T_1 / T_1 (1-0.5) + (0.5/4))$

$= 1 / 0.5 + (0.5 / 4)$

$\approx$ 1.6

3. Hence $\lim_{n\to\infty} S_n = \lim_{n\to\infty} \frac{1}{\left[0.9 + \frac{0.1}{n}\right]} \Rightarrow \frac{1}{0.9 + 0} \Rightarrow \frac{1}{0.9}$

$\therefore \lim_{n\to\infty} S_n \approx$ 1.11

# Excercise 1

1. $T_s = 30\%$

$T_p = 100\% - 30\% = 70\%$

$T_n = T_s + (T_p / n)$

$= T_1 \cdot 0.3 + \left[\frac{0.7}{2}\right] \cdot T_1$

$S_n = \frac{T_1}{T_n}$

$= \frac{T_1}{0.3T_1 + \frac{0.7}{2} \cdot T_1}$

$= \frac{1}{0.3 + \frac{0.7}{2}}$

$= \frac{1}{0.3 + 0.35}$

$= \frac{1}{0.65}$

$\approx 1.54$

2. $S_{16} = \frac{T_2}{T_{16}}$

$= \frac{0.3T_1 + \frac{0.7}{2} \cdot T_1}{0.3T_1 + \frac{0.7}{16} \cdot T_1}$

$= \frac{0.3 + \frac{0.7}{2}}{0.3 + \frac{0.7}{16}}$

$= 1.91$