Auto-Correlation Test (Example)

0.12, 0.01, 0.23, 0.28, 0.89, 0.31, 0.64, 0.28, 0.83, 0.93, 0.99, 0.15, 0.33, 0.35, 0.91, 0.41, 0.60, 0.27, 0.75, 0.88, 0.68, 0.49, 0.05, 0.43, 0.95, 0.58, 0.19, 0.36, 0.69, 0.87. (**α=0.025, Test No=3 at position 3rd, 8th, 13th are auto correlated**)   **N=30**

S1: Define Hypothesis,

S2: i=3, lag m=5

S3: Find **M**, **i+(M+1)m ≤ N**

$$3+(M+1)5 \leq 30$$

→ (M+1)5 <= 27

→ (M+1) <= 5.4

→ M <= 4.4 [So, M= max (4, 3, 2...0)]

M= 4

S4: $\hat{\rho}_{im} = \dfrac{1}{M+1}, \left[\sum_{k=0}^{M} R_{i+k_m} . R_{i+[k+1]m}\right] - 0.25$

$\hat{\rho}_{35} = \dfrac{1}{4+1} \left[\sum_{k=0}^{4} R_{3+5k} . R_{3+5[k+1]}\right] - 0.25$

$= \dfrac{1}{5} [R_3. R_8 + R_8. R_{13} + R_{13}. R_{18} + R_{18}. R_{23} + R_{23}. R_{28}] - 0.25$

$= \dfrac{1}{5} [0.23*0.28 + 0.28*0.33 + 0.33*0.27 + 0.27*0.05 + 0.05*0.36]$

$= \dfrac{1}{5} (0.2774) - 0.25$

$= 0.05548 - 0.25$

$= -0.19452$, **This is the estimator**

S5: $\sigma_{\hat{p}_m} = \dfrac{\sqrt{13(4)}+7}{12(4+1)} = \dfrac{\sqrt{52}+7}{60} = 0.128$

S6: $\mathbf{Z_0} = \dfrac{\hat{\rho}im}{\sigma_{\hat{p}_m}} = \dfrac{-0.19452}{0.128} = $ **-1.51**

S7: $Z_{0.025}$ = 1.96

S8: $-Z_{\alpha/2} \leq Z_0 \leq +Z_{\alpha/2}$

$-1.96 \leq$ **-1.51** ≤ 1.96, H_0 is accepted.