Auto-Correlation Test (Example)

0.19, 0.16, 0.82, 0.63, 0.04, 0.16, 0.30, 0.22, 0.88, 0.48, 0.29, 0.56, 0.44, 0.05, 0.81, 0.38, 0.59, 0.37, 0.71, 0.43, 0.92, 0.45, 0.57, 0.99, 0.20, 0.14, 0.64, 0.50, 0.73, 0.15, 0.02, 0.49, 0.86, 0.24, 0.90, 0.74, 0.41, 0.09, 0.80, 0.42. (**α=0.025, Test No=3 at position 2nd, 7th, 12th are auto correlated**) **N=40**

S1: Define Hypothesis,

S2: i=2, lag m=5

S3: Find **M**, **i+(M+1)m ≤ N**

2+(M+1)5 ≤ 40

→ (M+1)5 <= 38

→ (M+1) <= 7.6

→ M <= 6.6 [So, M= max (6,5, 4…0)]

M= 6

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

$\hat{\rho}_{25} = \frac{1}{6+1} \left[\sum_{k=0}^{6} R_{2+5k} . R_{2+5[k+1]}\right] - 0.25$

$= \frac{1}{7}$ [R_2. R_7 + R_7. R_{12} + R_{12}. R_{17} + R_{17}. R_{22} + R_{22}. R_{27} + R_{27}. R_{32}+ R_{32}. R_{37}]-0.25

$= \frac{1}{7}$ [0.16*0.30 + 0.30*0.56 + 0.56*0.59 + 0.59*0.45 + 0.45*0.64 + 0.64*0.49 + 0.49*0.41]

$= \frac{1}{7}$ (1.6144) - 0.25

= 0.23063 – 0.25

= -0.0193, **This is the estimator**

S5: $\sigma_{\hat{p}_m} = \frac{\sqrt{13(6)}+7}{12(6+1)} = \frac{\sqrt{78}+7}{84}$ = 0.10975

S6: $Z_0 = \frac{\hat{\rho}\mathbf{im}}{\sigma_{\hat{p}_m}} = \frac{-0.0193}{0.10975} =$ **-0.17**

S7: $Z_{0.025} = 1.96$

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

$-1.96 \leq -0.17 \leq 1.96$, H_0 is accepted.