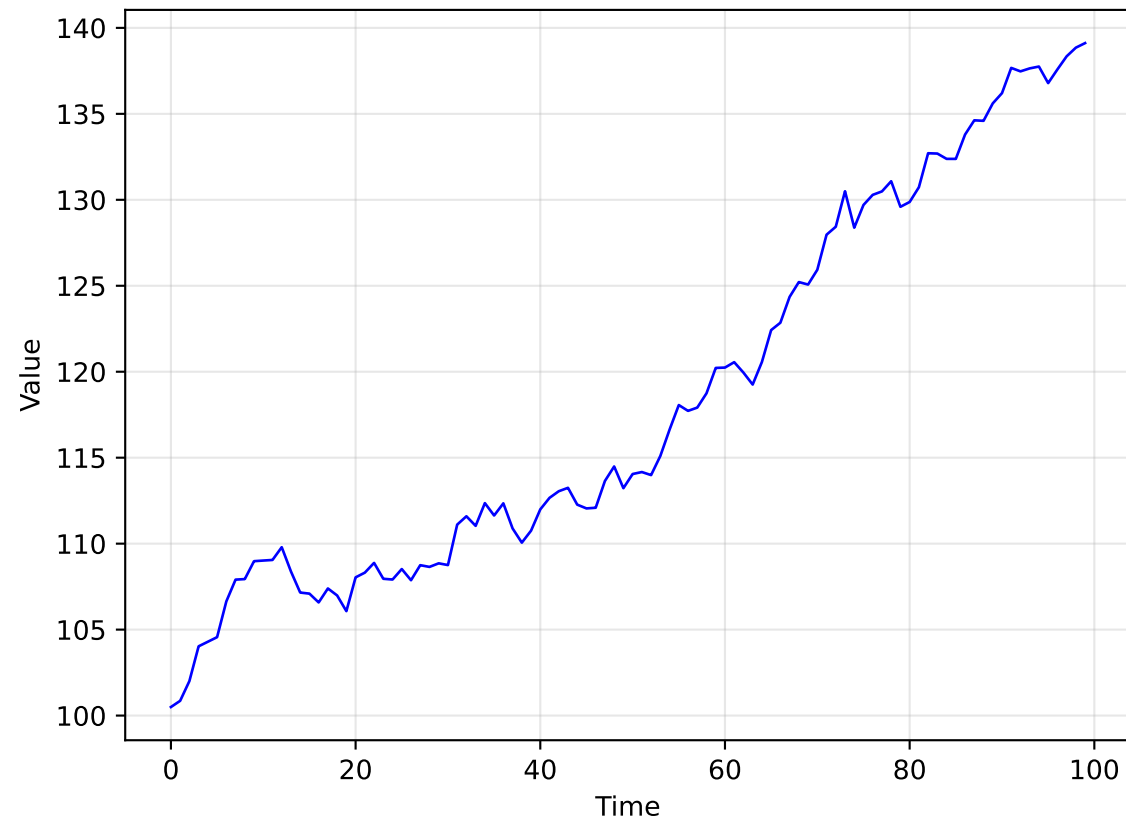
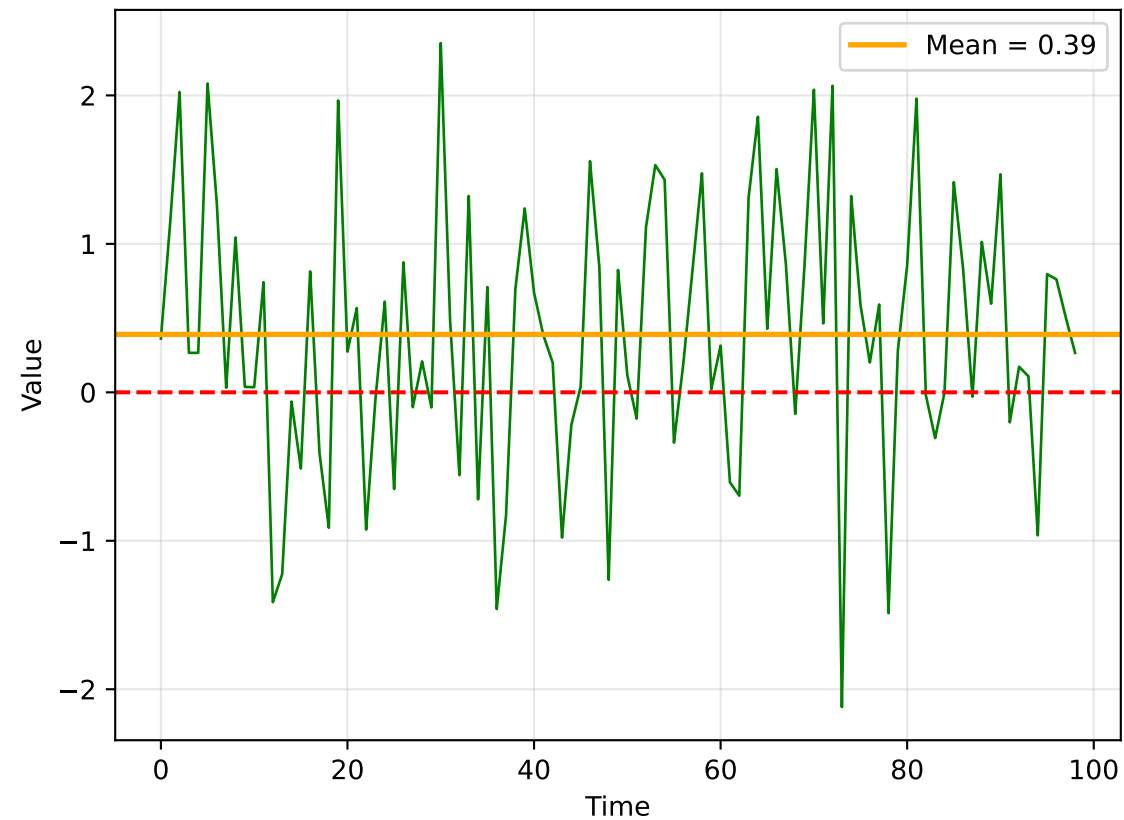
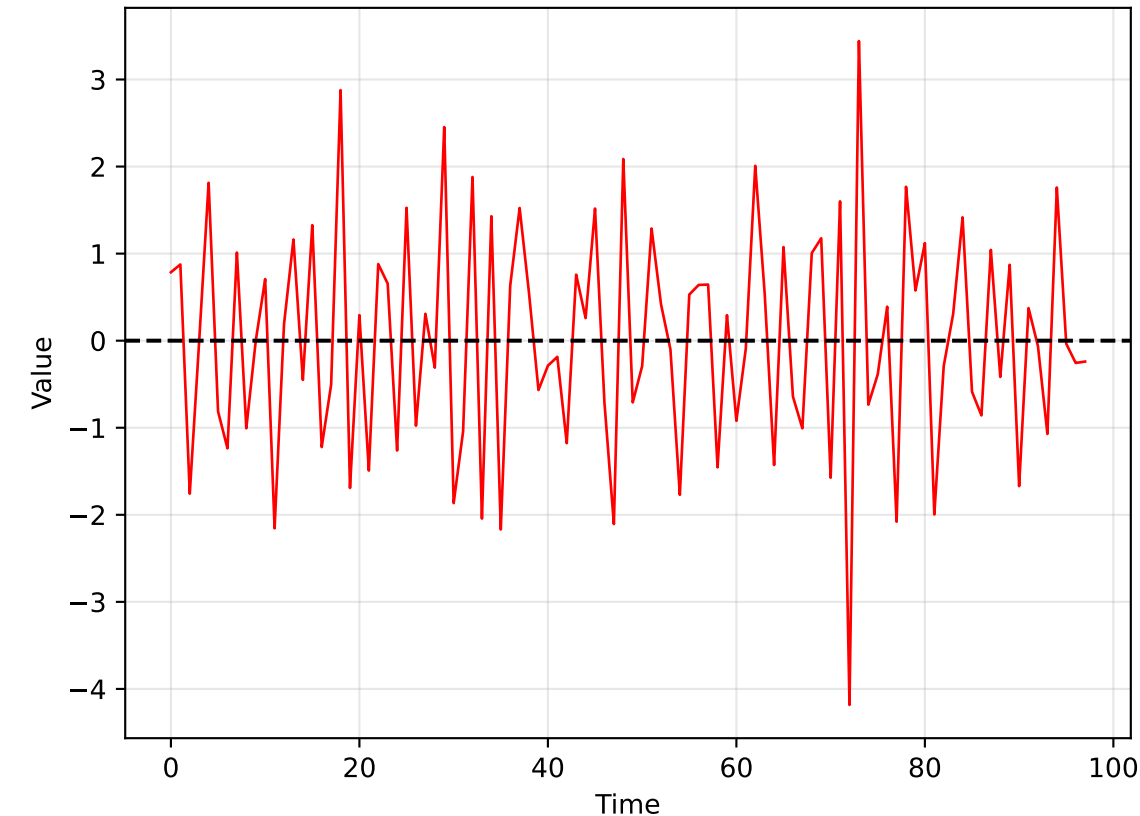


Original Series X_t First Difference $\Delta X_t = (1 - L)X_t$ Second Difference $\Delta^2 X_t = (1 - L)^2 X_t$ 

Lag Operator Summary

Notation:

$L X_t = X_{t-1}$ (one lag)
 $L^k X_t = X_{t-k}$ (k lags)

Difference Operator:

$\Delta = (1 - L)$
 $\Delta X_t = X_t - X_{t-1}$

Second Difference:

$\Delta^2 = (1 - L)^2 = 1 - 2L + L^2$
 $\Delta^2 X_t = X_t - 2X_{t-1} + X_{t-2}$

AR(p) in Lag Notation:

$\phi(L)X_t = \varepsilon_t$
 where $\phi(L) = 1 - \phi_1 L - \phi_2 L^2 - \dots - \phi_p L^p$

MA(q) in Lag Notation:

$X_t = \theta(L)\varepsilon_t$
 where $\theta(L) = 1 + \theta_1 L + \theta_2 L^2 + \dots + \theta_q L^q$

ARMA(p,q):

$\phi(L)X_t = \theta(L)\varepsilon_t$