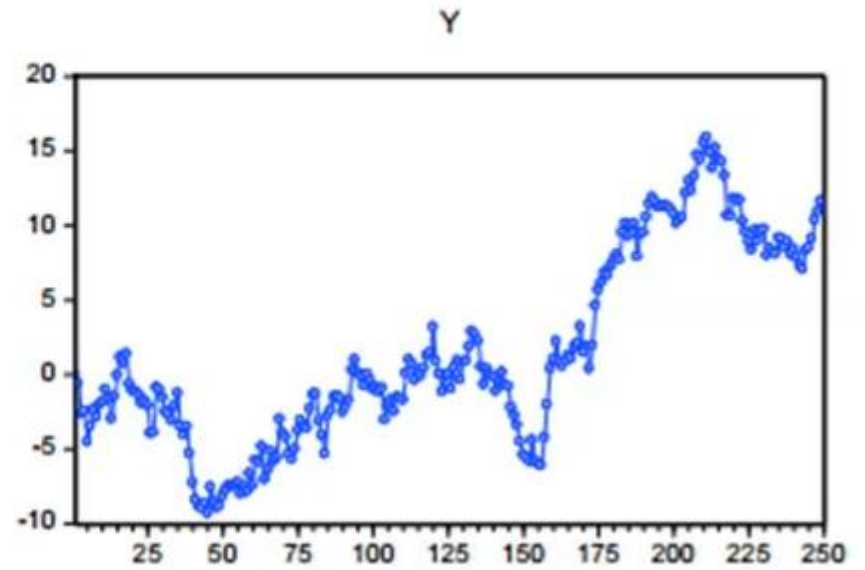
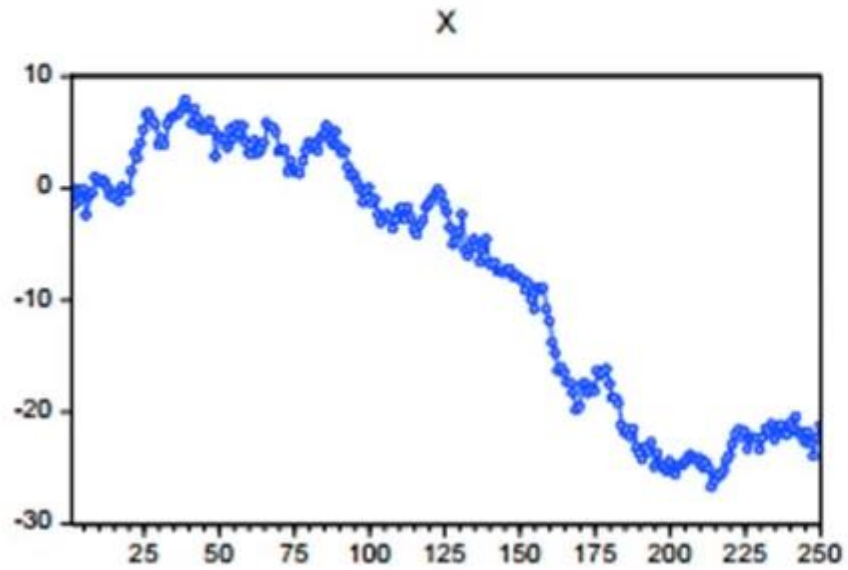
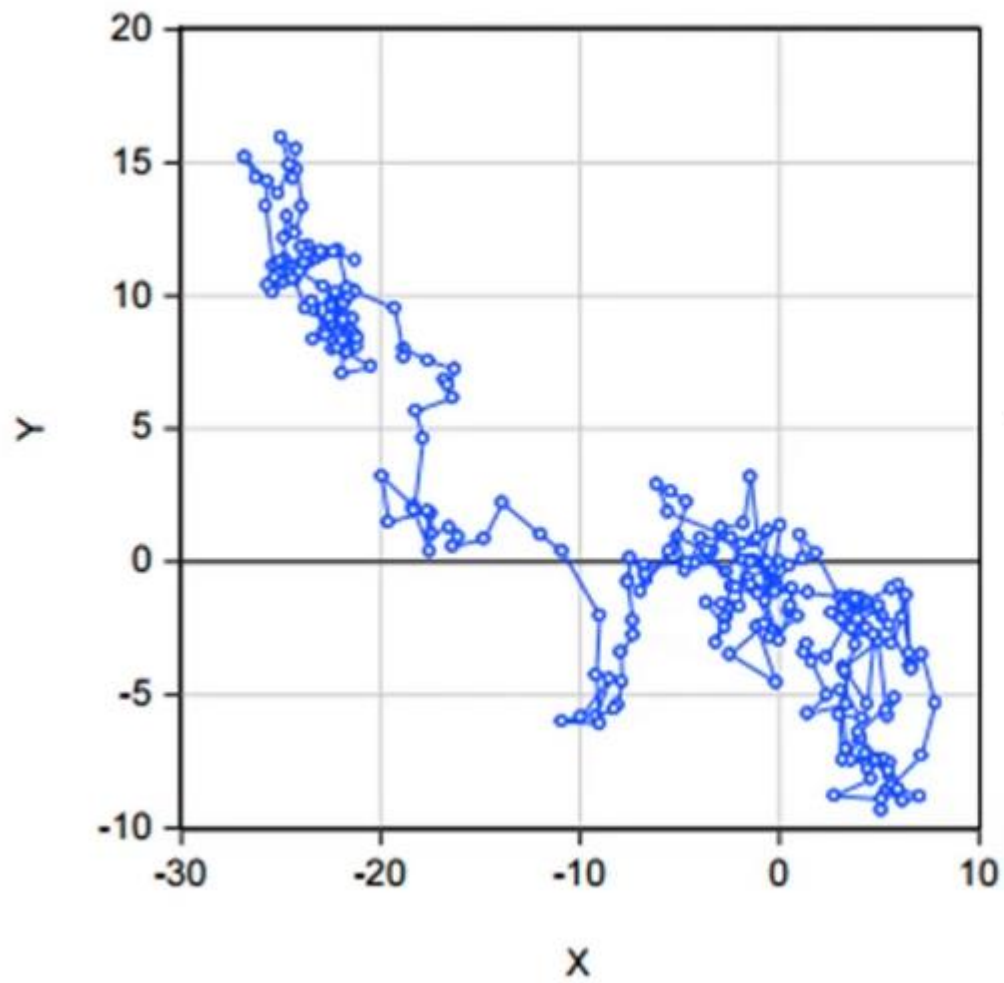


a)



random walk



→ misleading

$$b) \quad \varepsilon_{y_t} = 0.031 - 0.088 \varepsilon_{x_t} + \text{residual}$$



$$t\text{-value} = -1.317751 \approx -1.32$$

$$p\text{-value} = 0.1888 \approx 0.19$$

$$c) \quad \varepsilon_{y_t} = c + \gamma_1 \varepsilon_{y_{t-1}} + \gamma_2 \varepsilon_{y_{t-2}} + \gamma_3 \varepsilon_{y_{t-3}} + \gamma_4 \varepsilon_{x_t} + \gamma_5 \varepsilon_{x_{t-1}} + \gamma_6 \varepsilon_{x_{t-2}} + \gamma_7 \varepsilon_{x_{t-3}}$$

$$= 0.046 + 0.025 \varepsilon_{y_{t-1}} - 0.016 \varepsilon_{y_{t-2}} - 0.047 \varepsilon_{y_{t-3}} - 0.097 \varepsilon_{x_t} + 0.020 \varepsilon_{x_{t-1}} - 0.060 \varepsilon_{x_{t-2}} + 0.009 \varepsilon_{x_{t-3}}$$

$$\text{with } R^2 = 0.015733$$

$$H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = \gamma_7 = 0$$

F-test ( $g, n-k$ )

↓

# parameter restrictions  $H_0$

↘

# obs

↗

# variables in the unrestricted model

$$g = 7$$

$$n = 247 \text{ (3 lags RHS)}$$

$$k = 8$$

$$\text{dof}(g, n-k) = (7, 239)$$

$$R_0^2 = 0.000$$

$$F\text{-stat} = ((R_1^2 - R_0^2)/g) / ((1 - R_1^2)/(n - k))$$

$$= ((0.015733 - 0)/7) / ((1 - 0.015733)/(247 - 9))$$

$$= 0.55$$

As  $F = 0.55 < 2.0 \rightarrow$  do not reject  $H_0$

$$d) y_t = -2.487 - 0.515x_t + \text{residual}$$

$$\downarrow$$

$$t\text{-value} = -33.02$$

$$p\text{-value} = 0.000$$

regression = misleading

part (a) shows seemingly negative 'effect' of  $x_t$  on  $y$ .

$$e) e_t = 0.001 + 0.925e_{t-1} + \text{residual}$$

$$\downarrow$$

$$t\text{-value} = 38.17$$

$$p\text{-value} = 0.00$$

→ residuals are very strongly correlated