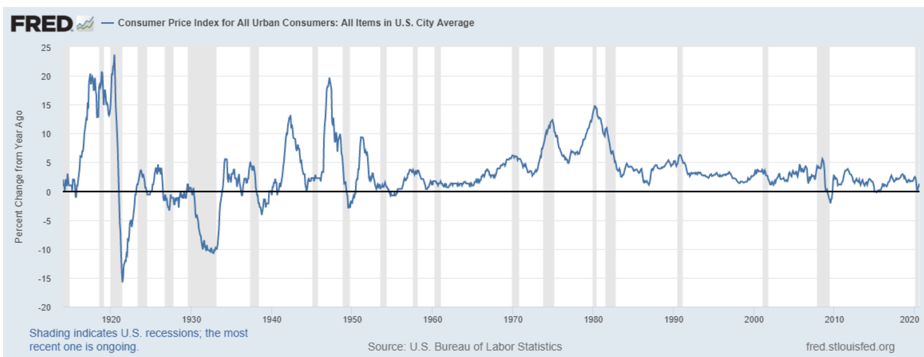
Quiz 6: mini problems 1,2,3

Question 1.

Using given plot, comment whether this time series is stationary or non-stationary.



Question 2.

Suppose $Y_1, ..., Y_t$ is a sample from a time series

$$Y_t = Y_{t-1} + x_t, \quad x_t = \phi x_{t-1} + \varepsilon_t$$

where ε_t is an i.i.d. sequence with zero mean and variance 1 and $|\phi| < 1$.

- **(a)** Find the 1-step ahead forecast $\hat{Y}_t(1)$ of Y_{t+1}, the forecast error and the variance of the forecast error.
- **(b)** Find the 2-step ahead forecast $\hat{Y}_t(2)$ of Y_{t+2}, the forecast error and the variance of the forecast error.
- **(c)** Suggest a forecast for Y_{t+20}.

Question 3.

Consider time series

$$Y_t = \mu + Y_{t-1} + \varepsilon_{t-1},$$

where ε_t is a white noise sequence with zero mean and variance 1. Suppose that $Y_0 = 1$.

- Find $E[Y_t]$
- $Var(Y_t)$.