MSCA 31006 Time Series Analysis and Forecasting

Assignment #1 - Introduction
Due Date – Beginning of Session #2
Total Points: 6%

Instructions:

- Total number of points is 60. The assignmnet's final grade will be multiplied by $1/6$ to calculate its weight on the final grade.
- Mark the question number and your final answer clearly (use a textbox.)
- Remember to show and explain your work (*If you can't explain it, you don't understand it.*)
- Please submit your solution through Canvas.

(15 points) Question 1:

Suppose $E(X) = 2$, $Var(X) = 9$, $E(Y) = 0$, $Var(Y) = 4$, and $Corr(X,Y) = 0.25$. Find:
(a) $Var(X + Y)$.
(b) $Cov(X, X + Y)$.
(c) $Corr(X + Y, X - Y)$.

(6 points) Question 2:

If X and Y are dependent but $Var(X) = Var(Y)$, find $Cov(X + Y, X - Y)$.

(15 points) Question 3:

Suppose $Y_t = 5 + 2t + X_t$, where $\{X_t\}$ is a zero-mean stationary series with autoco-variance function γ_k.
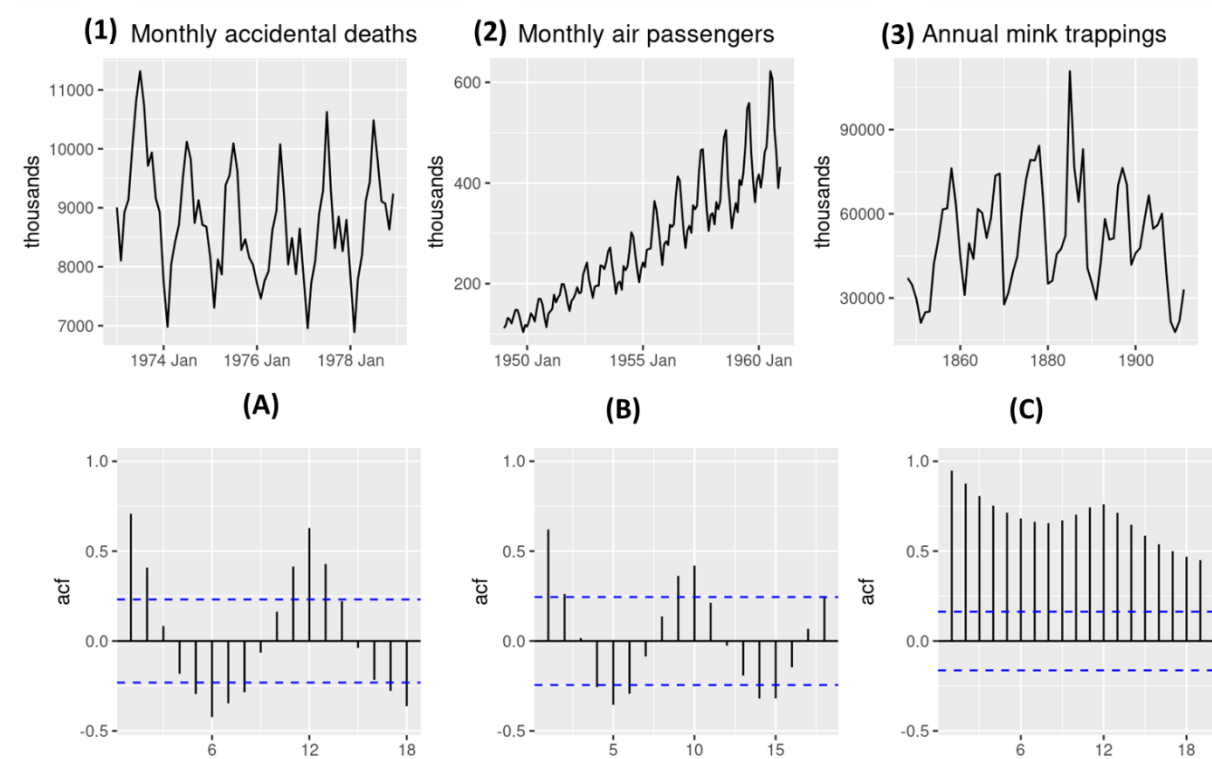(a) Find the mean function for $\{Y_t\}$.
(b) Find the autocovariance function for $\{Y_t\}$.
(c) Is $\{Y_t\}$ stationary? Why or why not?

(12 points) Question 4:

The following time plots and ACF plots correspond to three different time series. Your task is to match each time plot in the first row with one of the ACF plots in the second row.

(12 points) Question 5:

Simulate a normal white noise sample of size 10 with the mean 2.3 and standard deviation 1.2, and then calculate the sample mean and sample standard deviation. Are you satisfied with your computed results? How about the sample size 10,000?