1. Problems from the book: 1.5-1.10

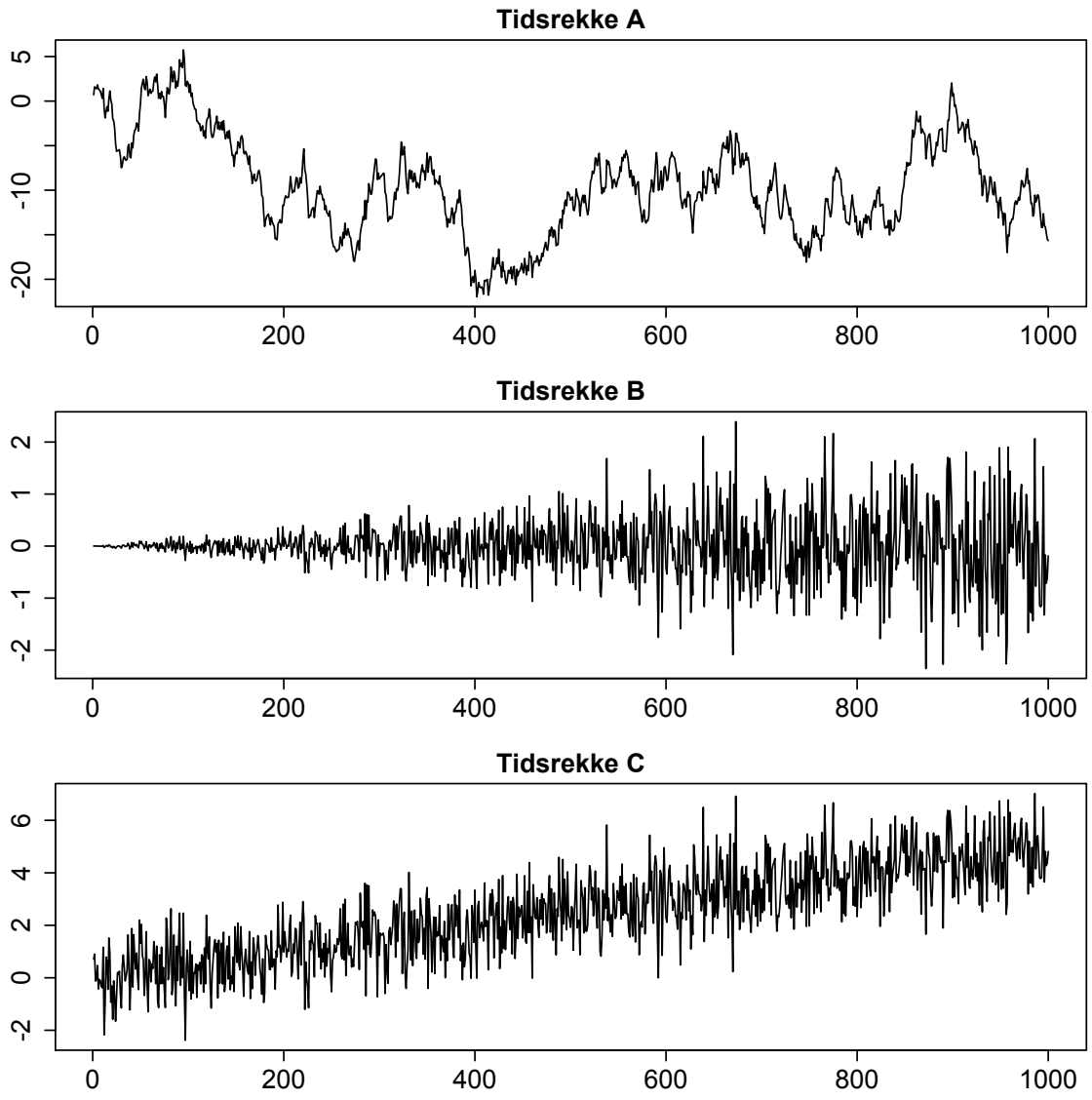
2. a) Show that if $Y = aX + b$ where a and b are real constants ($a \neq 0$), then $\text{corr}(X, Y) = 1$ if $a > 0$ and $\text{corr}(X, Y) = -1$ if $a < 0$.

b) Let the random variable (rv) X have a symmetrical pdf $f_X(x)$ (e.g. $f_X(-x) = f_X(x)$), and define the rv Y by $Y = aX^2$ where $a \neq 0$ is a constant. Show that $\text{corr}(X, Y) = 0$ and explain why this is the case even though Y is completely dependent on X.

c) Let x_t be independent and identically distributed (with finite variance). Is x_t strictly stationary? Show that the auto-correlation function of $|x_t|$ (absolute value of x_t) is

$$\rho_{|x_t|}(h) = \begin{cases} 1 & \text{if } h = 0 \\ 0 & \text{if } h \neq 0 \end{cases}$$

3. For hver tidsrekke i figur 1, avgjør om tidsrekka er stasjonær eller ikke-stasjonær (dvs om det er sannsynlig at dataene kommer fra en stasjonær prosess eller ikke). Begrunn svaret.



Figur 1: Tre tidsrekker.