# Time Series Analysis - Week 3

**Introduction**
This is a *voluntary* mini-project where you will examine data with trends and seasons, trying to determine suitable model structures for them. You complete it on your own and you *do not* need to hand in anything after completing it; it is just meant to get you started.

Before you begin:

- View the online videos related to identification, as well as read chapter 4 in the textbook.
- Download the needed matlab functions and data files from the course webpage.

**Task 1**
Use Matlab to generate $N = 1000$ samples of the SARIMA process with the $A(z)$ and $C(z)$ polynomials

$$A(z) = 1 - 0.5z^{-1} + 0.7z^{-2}$$
$$C(z) = 1 - 0.7z^{-12}$$

and with a seasonal periodicity of $s = 12$, i.e., such that $A(z)\nabla_s y_t = C(z)e_t$. Section 3.4 in the first computer exercise explains how you can use Matlab to do this. Plot $y_t$ as well as the ACF and the PACF of the process; can you see the seasonality of the process? Try forming a new process such that $w_t = \nabla_s y_t$ and examine the ACF and the PACF of $w_t$. Note that you need to remove the initial $s$ samples after you filtered the process. Can you determine suitable model orders from the ACF and the PACF? You can try increasing the data length to see if this helps. Try changing the season to $s = 1$ to see how this affects the data and the ACF and PACF.

**Task 2**
Load the data set containing temperature measurements from Svedala using the command `load svedala`. Can you determine the seasonality of the data? What seems to be a reasonable model for the data? This task is the initial part of Section 3.5 in the first computer exercise.