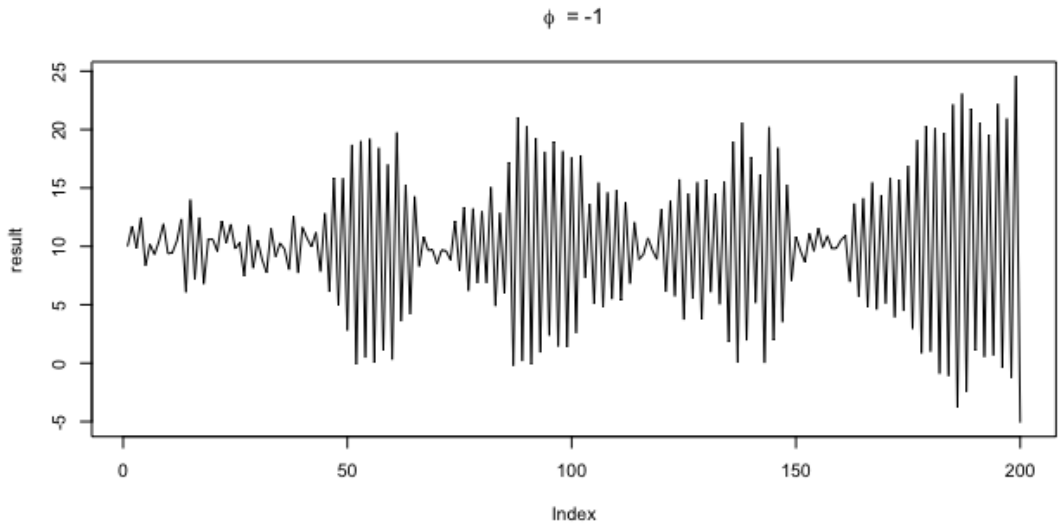
TDDE07 - Lab 4

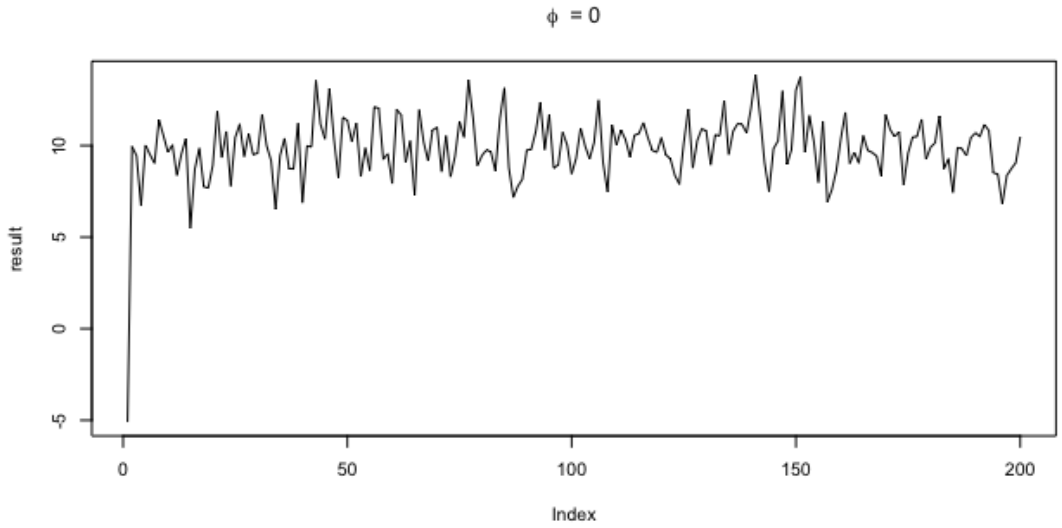
Sophie Lindberg - sopli268
Arvid Edenheim - arved490

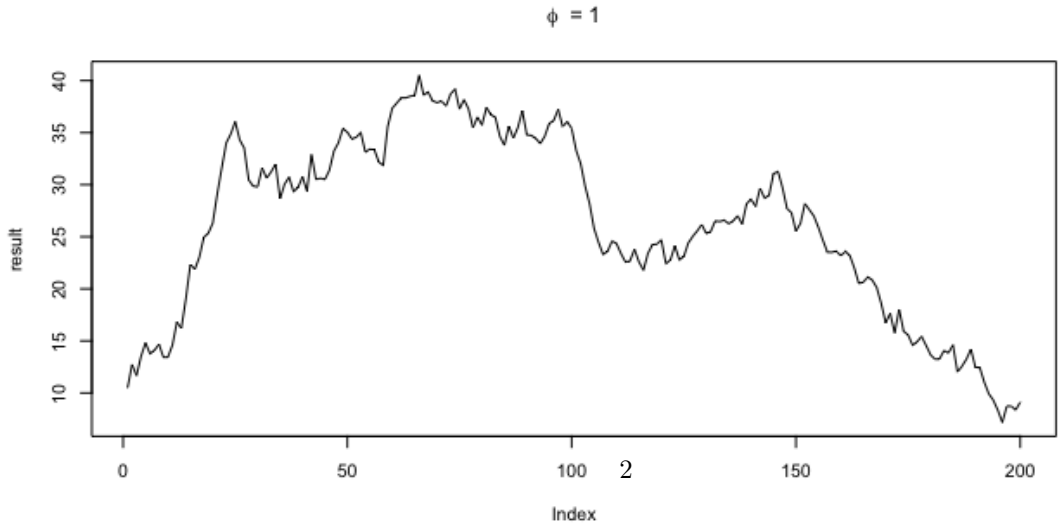
2019-05-24

1 - Time series models in Stan

1a) AR(1)-process







It is clear that ϕ has a large effect on $x_{1:T}$. The figure above depicts 3 different scenarios where ϕ is equal to -1, 0 and 1. In the first example, we have that

$$x\ t\ = \mu\ \text{-}\ (x\ t\text{-}1\ \ \text{-}\ \mu) + \epsilon_t$$

As can be seen in the figure above the values of x_t oscillate between positive and negatiive values when $\phi = -1$. This is because ϕ changes the sign of x_t in each iteration.

When $\phi = 0$ we have that

$$x\ t\ = \mu + \epsilon_t$$

In this case the value of x_t only depends on μ and ϵ_t, meaning the values will be close to μ.

In the last example we have that

$$x\ t\ = \mu + (x\ t\text{-}1\ \ \text{-}\ \mu) + \epsilon_t$$

In this case, x_t value depends on the previous value but won't change sign in each iteration as long as the error is fairly small.

:

	Posterior mean	Lower limit	Upper limit
mu	0.819	0.275	1.380
sigma	1.841	1.508	2.256
phi	0.901	0.838	0.961

:

	Posterior mean	Lower limit	Upper limit
mu	6.275	4.942	7.581
sigma	2.131	1.741	2.610
phi	0.379	0.251	0.510

1b)