# R software code

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# Exercise 2.3

# Simulate ARMA(1,1) process

# y\_{t} = 0.8 y\_{t-1} + 0.2 \epsilon\_{t-1} + epsilon\_{t}

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rm(list=ls())

# 1. Simulation

set.seed(1234)

ARMA11.sim<- arima.sim(n = 50, list(ar=0.8, ma=0.2), innov=rnorm(50))

# rand.gen = function(n, ...) sqrt(0.3) \* rt(n, df = 2))

# 2. Plot of autocorrelation and partial autocorrelation functions

op<- par(no.readonly=TRUE)

layout(matrix(c(1,1,2,3),2,2,byrow=TRUE))

plot(ARMA11.sim, main='ARMA(1,1) Simulation', ylab='')

acf(ARMA11.sim, main='Autocorrelations', ylab='', ylim=c(-1,1))

pacf(ARMA11.sim, main='Partial Autocorrelation', ylab='', ylim=c(-1,1))

par(op)

# 3. Fitting

ARMA11.fit<- arima(ARMA11.sim, c(1,0,1), include.mean=FALSE, method='ML')