

HW 5 Code

Jared Yu

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### 1
# a
0.6*(2.5-0)+0.8*0.5
0.6*(1.9-0)
0.6*(1.14-0)

# b
15 + 0.6*(2.5-15)+0.8*0.5
15 + 0.6*(7.9-15)+0.8*0
15 + 0.6*(10.74-15)+0.8*0

# c
0.01+0.6*(2.5-0.01)+0.8*0.5
0.01+0.6*(2.5-0.01)+0.8*0.5 + 7.5

0.01+0.6*(1.904-0.01)+0.8*0
0.01+0.6*(1.904-0.01)+0.8*0 + 9.404

0.01+0.6*(1.1464-0.01)+0.8*0
0.01+0.6*(1.1464-0.01)+0.8*0 + 10.5504

### 2
# a
0+0.6*(2.5-0)+(-0.8)*(-0.3)+0.5*(0.5)
0+0.6*(1.99-0)+(-0.8)*(0)+0.5*(-0.3)
0+0.6*(1.044-0)+(-0.8)*(0)+0.5*(0)

# b
15+0.6*(2.5-15)+(-0.8)*(-0.3)+0.5*(0.5)
15+0.6*(7.99-15)+(-0.8)*(0)+0.5*(-0.3)
15+0.6*(10.644-15)+(-0.8)*(0)+0.5*(0)

# c
0.01+0.6*(2.5-0.01)+(-0.8)*(-0.3)+0.5*(0.5)
0.01+0.6*(2.5-0.01)+(-0.8)*(-0.3)+0.5*(0.5) + 7.5

0.01+0.6*(1.994-0.01)+(-0.8)*0+0.5*(-0.3)
0.01+0.6*(1.994-0.01)+(-0.8)*0+0.5*(-0.3) + 9.494

0.01+0.6*(1.0504-0.01)+(-0.8)*0+0.5*(0)
0.01+0.6*(1.0504-0.01)+(-0.8)*0+0.5*(0) + 10.5444

### 3
# a
par(mfrow=c(2,1))
jmax <- 30
lags <- 0:jmax
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rhos <- ARMAacf(ar = c(0.4, 0.5), lag.max = jmax)
plot(lags, rhos, pch = 19, xlab = "Lag", ylab = "ACF", ylim = c(-0.01, 1.1),
     main = 'ACF of AR(2) theta1=0.4, theta2=0.5')
segments(x0 = lags, y0 = 0, x1 = lags, y1 = rhos)
abline(h = 0)

rhos2 <- ARMAacf(ar = c(0.4, 0.5), lag.max = jmax, pacf = TRUE)
lags2 <- 1:jmax
plot(lags2, rhos2, pch = 19, xlab = "Lag", ylab = "PACF",
     main = 'PACF of AR(2) theta1=0.4, theta2=0.5')
segments(x0 = lags2, y0 = 0, x1 = lags2, y1 = rhos2)
abline(h = 0)

# b
rhos3 <- ARMAacf(ar = c(-0.4, 0.5), lag.max = jmax)
plot(lags, rhos3, pch = 19, xlab = "Lag", ylab = "ACF",
     main = 'ACF of AR(2) theta1=-0.4, theta2=0.5')
segments(x0 = lags, y0 = 0, x1 = lags, y1 = rhos3)
abline(h = 0)

rhos4 <- ARMAacf(ar = c(-0.4, 0.5), lag.max = jmax, pacf = TRUE)
plot(lags2, rhos4, pch = 19, xlab = "Lag", ylab = "PACF",
     main = 'PACF of AR(2) theta1=-0.4, theta2=0.5')
segments(x0 = lags2, y0 = 0, x1 = lags2, y1 = rhos4)
abline(h = 0)

# c
rhos5 <- ARMAacf(ar = c(1.5, -0.8), lag.max = jmax)
plot(lags, rhos5, pch = 19, xlab = "Lag", ylab = "ACF",
     main = 'ACF of AR(2) theta1=1.5, theta2=-0.8')
segments(x0 = lags, y0 = 0, x1 = lags, y1 = rhos5)
abline(h = 0)

rhos6 <- ARMAacf(ar = c(1.5, -0.8), lag.max = jmax, pacf = TRUE)
plot(lags2, rhos6, pch = 19, xlab = "Lag", ylab = "PACF",
     main = 'PACF of AR(2) theta1=1.5, theta2=-0.8')
segments(x0 = lags2, y0 = 0, x1 = lags2, y1 = rhos6)
abline(h = 0)

# d
rhos7 <- ARMAacf(ar = c(-1.5, -0.8), lag.max = jmax)
plot(lags, rhos7, pch = 19, xlab = "Lag", ylab = "ACF",
     main = 'ACF of AR(2) theta1=-1.5, theta2=-0.8')
segments(x0 = lags, y0 = 0, x1 = lags, y1 = rhos7)
abline(h = 0)

rhos8 <- ARMAacf(ar = c(-1.5, -0.8), lag.max = jmax, pacf = TRUE)
plot(lags2, rhos8, pch = 19, xlab = "Lag", ylab = "PACF",
     main = 'PACF of AR(2) theta1=-1.5, theta2=-0.8')
segments(x0 = lags2, y0 = 0, x1 = lags2, y1 = rhos8)
abline(h = 0)

# e

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rhos9 <- ARMAacf(ar = c(-1.5, -0.8), ma = c(-1.2, 0.3), lag.max = jmax)
plot(lags, rhos9, pch = 19, xlab = "Lag", ylab = "ACF",
     main = 'ACF of ARMA(2,2) theta1=-1.5, theta2=0.3, phi1=-1.2, phi2=0.3')
segments(x0 = lags, y0 = 0, x1 = lags, y1 = rhos9)
abline(h = 0)

rhos10 <- ARMAacf(ar = c(-1.5, -0.8), ma = c(-1.2, 0.3), lag.max = jmax, pacf = TRUE)
plot(lags2, rhos10, pch = 19, xlab = "Lag", ylab = "PACF",
     main = 'PACF of ARMA(2,2) theta1=-1.5, theta2=0.3, phi1=-1.2, phi2=0.3')
segments(x0 = lags2, y0 = 0, x1 = lags2, y1 = rhos10)
abline(h = 0)

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