Figure 7-3

September 11, 2020

[ ]:
```
# install the following package and library
install.packages("ggplot2")

library("ggplot2")
```

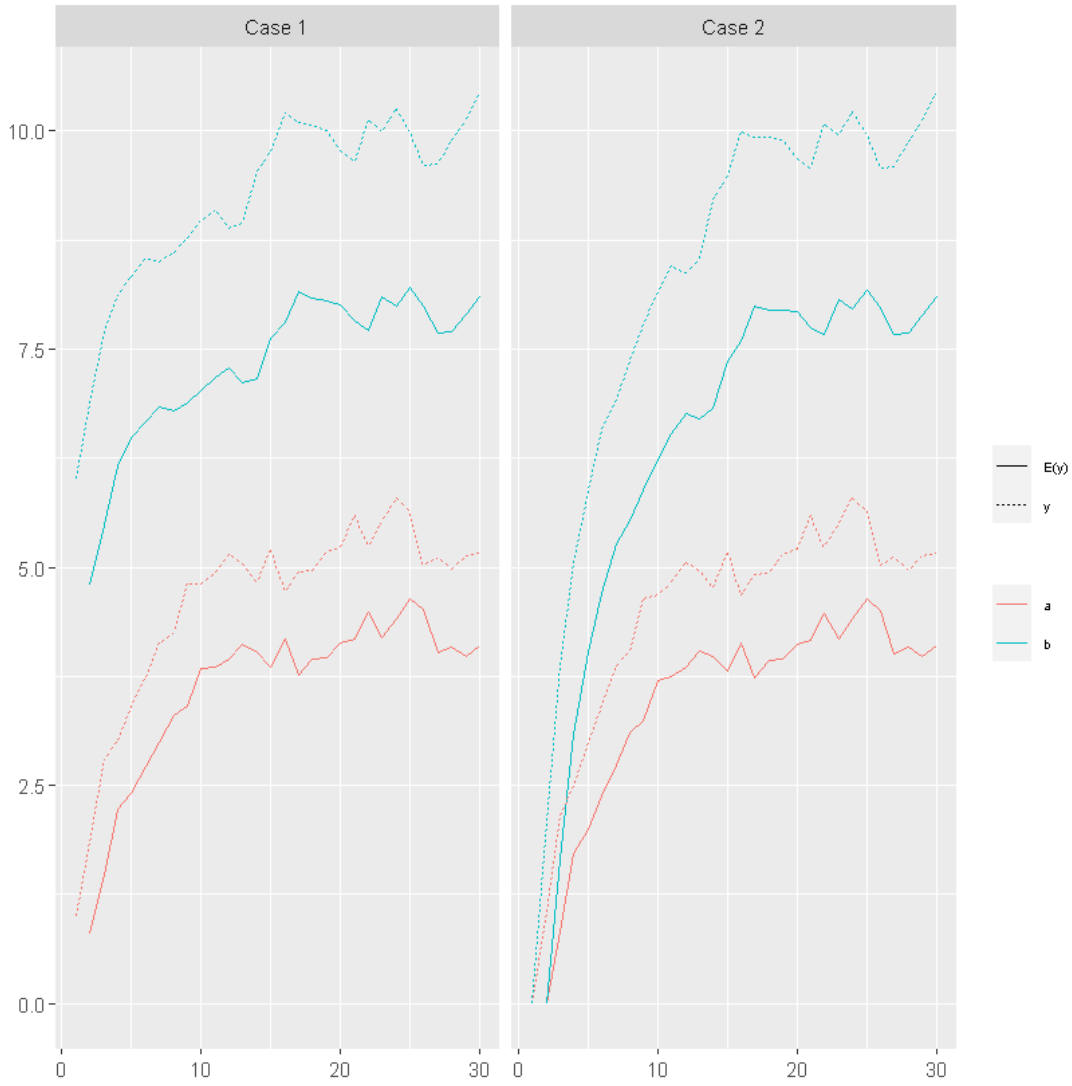
[4]:
```
##---------------------------------Block 1---------------------------------

#### Figure 7.3 ####

set.seed(2)
snu <- 0.2
beta <- 0.8
T <- 30L
nu1 <- rnorm(T, sd = snu)
nu2 <- rnorm(T, sd = snu)
mu1 <- 1
mu2 <- 2
y1 <- y2 <- Ey1 <- Ey2 <- rep(0, T)
y1[1] <- 1
y2[1] <- 6
Ey1[1] <- Ey2[1] <- NA
for(t in 2:T){
  y1[t] <- y1[t-1] * beta + mu1 + nu1[t]
  Ey1[t] <- y1[t-1] * beta
  y2[t] <- y2[t-1] * beta + mu2 + nu2[t]
  Ey2[t] <- y2[t-1] * beta
}
dd <- data.frame(x = rep(1:30, 4), y = c(y1, y2, Ey1, Ey2),
                 var = rep(c("y", "E(y)"), each = 30 * 2),
                 id = rep(rep(letters[1:2], each = 30), 2),
                 case = "Case 1")
set.seed(2)
snu <- 0.2
beta <- 0.8
T <- 30L
nu1 <- rnorm(T, sd = snu)
nu2 <- rnorm(T, sd = snu)
```

```r
mu1 <- 1
mu2 <- 2
y1 <- y2 <- Ey1 <- Ey2 <- rep(0, T)
Ey1[1] <- Ey2[1] <- NA
for(t in 2:T){
  y1[t] <- y1[t-1] * beta + mu1 + nu1[t]
  Ey1[t] <- y1[t-1] * beta
  y2[t] <- y2[t-1] * beta + mu2 + nu2[t]
  Ey2[t] <- y2[t-1] * beta
}
dd2 <- data.frame(x = rep(1:30, 4), y = c(y1, y2, Ey1, Ey2),
                  var = rep(c("y", "E(y)"), each = 30 * 2),
                  id = rep(rep(letters[1:2], each = 30), 2),
                  case = "Case 2")
dd <- rbind(dd, dd2)

gp <- ggplot(dd, aes(x=x, y = y, lty = var, colour = id)) +
    geom_line() + facet_wrap(~ case) +
    xlab("") + ylab("") +
    theme(legend.text = element_text(size = 6),
          legend.title = element_blank(),
          axis.title = element_text(size = 8))
gp
```


Case 1
Case 2
10.0
7.5
5.0
2.5
0.0
0
10
20
30
E(y)
y
a
b