DSC 152:
Applied Statistical Data Analysis and Inference

Lecture #17 Part 2
Introduction to
Time Series Analyses

Moving Average Models

In a Moving Average model, each value is a function of a *weighted average of past values.*

Examples

- A period of high demand at a store results in the store increasing their inventory; if demand drops for long enough, they will decrease their inventory
- Prolonged weather patterns may influence foot traffic at retail locations, impacting their sales.

Moving Average models are referenced as ~~MA(p)~~ MA(q) where ~~p~~ q is the number of past values that influence the current value.

(apologies for the typo, I originally had this as MA(p) in the slides)

Moving Average Models

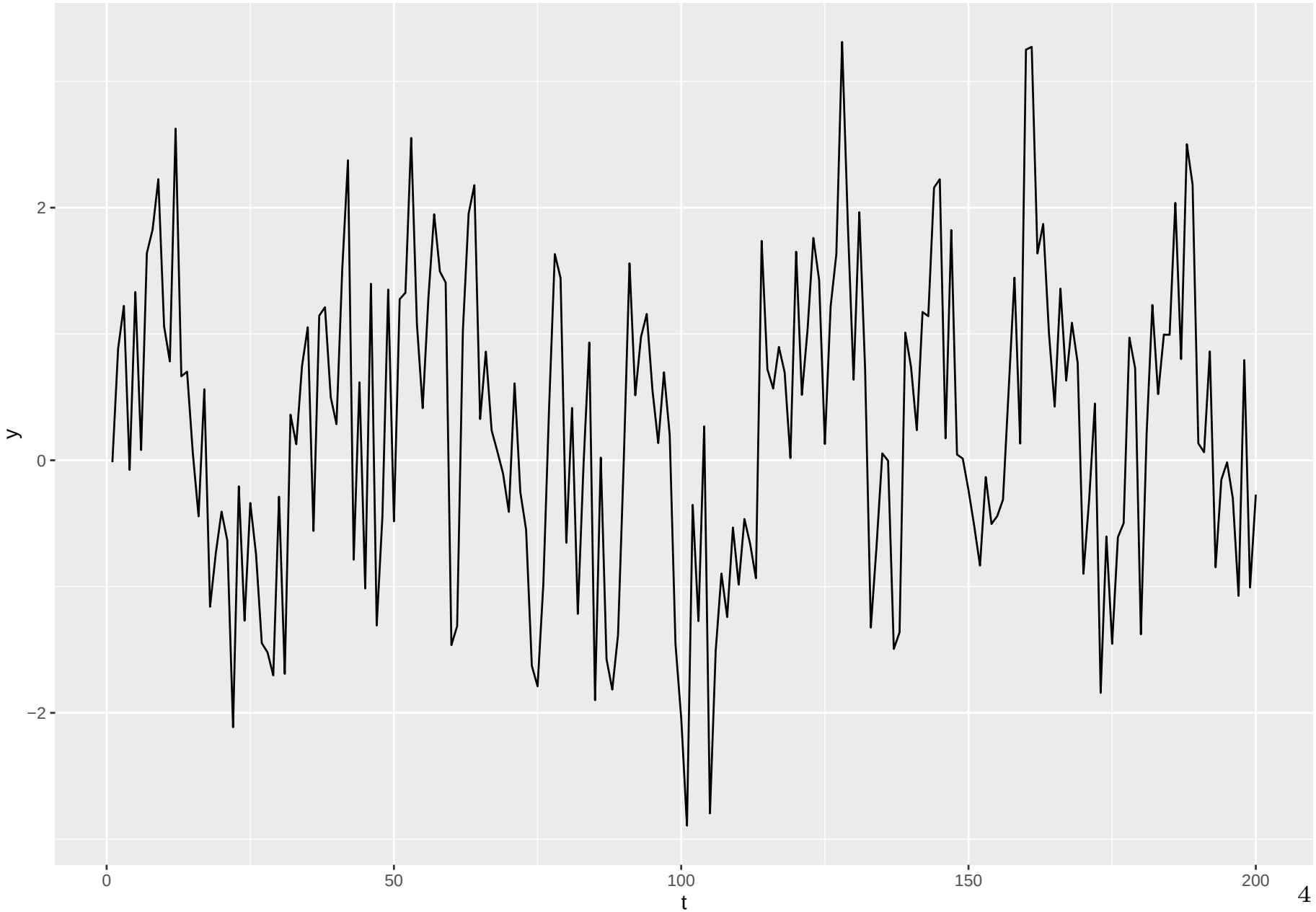
What might an MA(q) process look like?

Let's simulate some values according to an MA(5) process and plot it:

```
y <- arima.sim(model =
                 list(ma = c(0.5, 0.4, 0.3, 0.2, 0.1)),
               n = 200)
t <- 1:200
df <- data.frame(y=y, t=t)
ggplot(df, aes(x=t, y=y)) +
  geom_line()
```

Moving Average Models

What might an MA(q) process look like?

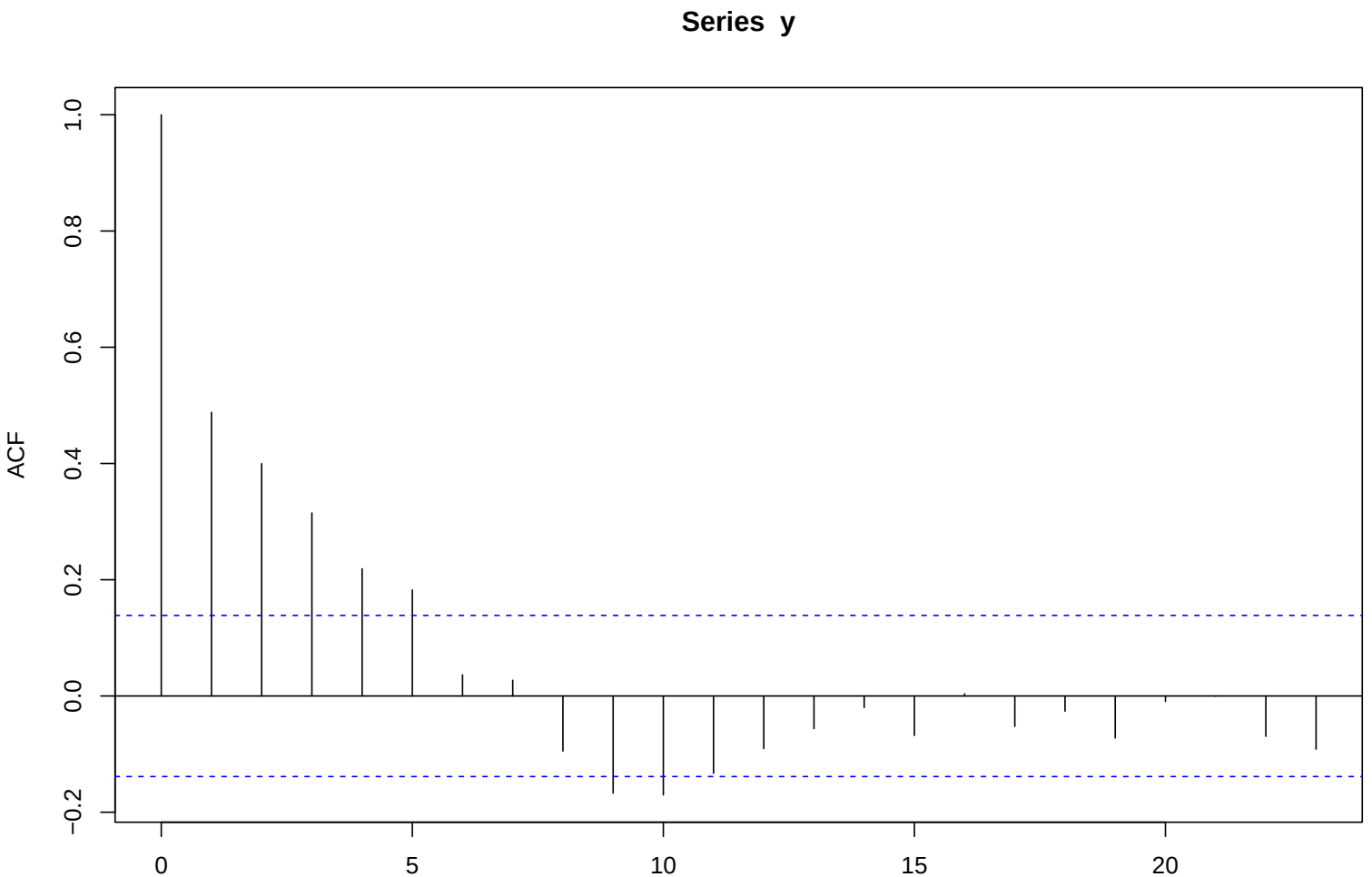


Moving Average Models

What might an MA(q) process look like?

It's hard to discern from that plot! But what about an ACF plot?

```
acf(y)
```



Lucas 2013 paper

Your Turn #2

- Load in the data from the `casino_poker_data.csv` file on the course website
- Make a timeplot of the `R2_COIN` variable
- Make an ACF plot of the `R2_COIN` variable and briefly comment on what you observe.