**STT 811**

**In-Class Assignment 20**

1. For the beer dataset
   1. Import the data

beer <- read.csv("data/beer.csv")

* 1. Convert it into a time series

beer\_ts <- ts(beer$Monthly.beer.production, frequency = 12, start = c(1956, 1))

* 1. Graph the time series. Does it appear that there is seasonality?

tsn\_beer <- decompose(beer\_ts, type = "multiplicative")

plot(tsn\_beer)

Chart, histogram

Description automatically generated

* 1. Create forecasts using
     1. Naïve

beer\_naive <- naive(beer\_ts)

plot(beer\_naive)

Chart, line chart

Description automatically generated

* + 1. Seasonal naïve

beer\_snaive <- snaive(beer\_ts, h = 12)

plot(beer\_snaive)

Chart, line chart

Description automatically generated

* + 1. Simple exponential smoothing

beer\_ses <- ses(beer\_ts)

plot(beer\_ses)

Chart, line chart

Description automatically generated

* + 1. Holt

beer\_holt <- holt(be er\_ts)

plot(beer\_holt)

Chart, line chart

Description automatically generated

* + 1. Holt-winters

beer\_hw <- hw(beer\_ts, h = 12)

plot(beer\_hw)

Chart, line chart

Description automatically generated

* 1. For each, compute the MAPE. Which one has the best MAPE?

mean(abs(beer\_naive$residuals)/beer\_ts)

mean(abs(beer\_snaive$residuals)/beer\_ts)

mean(abs(beer\_ses$residuals)/beer\_ts)

mean(abs(beer\_holt$residuals)/beer\_ts)

mean(abs(beer\_hw$residuals)/beer\_ts)

Holt-winters had the lowest MAPE.

* 1. Graph the series together with the best forecast model. Chart, line chart

     Description automatically generated