Review for Midterm 1

- Problem Sets are best review
- Questions will be similar in style and substance
- Questions can come from text, lecture slides, class discussion

Core Theory

- What is the theoretical best forecast for a random variable y given another random variable x? Why?

Core Theory

- What is a point forecast?
  - Can you explain in words?
- What is an interval forecast?
  - Can you explain in words?
  - What are the desired properties of an interval forecast?

Terminology

- What is the forecast horizon h?
- Explain annual, quarterly, monthly, weekly data frequencies.

Estimation

- Given a linear forecasting model, what is the primary method to estimate the coefficients?
- Why? Why is this an appropriate method?

Forecast Error

- Why is there forecast error? Explain the components:
  - Equation error
  - Estimation error
- Given parameter estimates, how can you estimate the variance of the equation error?

Forecast Intervals

- Given a point forecast and a standard deviation of forecast, explain how to construct a forecast interval based on the normal approximation

Time Series Plots

- Evaluate time-series plots of actual data
- Can you determine by visual inspection if the series is in levels, log-levels, or growth rates?
- Can you determine which series are seasonally adjusted versus unadjusted?
- Can you determine which trend model might be appropriate for a given series:
  - Constant mean, linear trend, quadratic, breaking

Linear Forecasts

- Use linear equations to make point forecasts
  - Including linear trends, seasonality, and lags
  - Numerically calculate point forecasts
  - One-step and h-step
- Use linear equations to make interval forecasts
  - One-step

Stationarity

- Understand meaning of “mean statationary”
- “Variance stationary”
- “Covariance stationary”
- Why are these concepts useful?

Autocorrelation Functions

- What is the definition and what does it mean?
- Evaluate actual autocorrelation functions.
  - Describe the serial correlation properties of the time-series
  - Ergodic, seasonal, white noise, moving average, slow decay, positive autocorrelation, geometric decay, negative autocorrelation

Moving Average Models

- Understand the fundamentals
  - Mean
  - Variance
  - Point forecasts
  - Interval forecasts
- Use MA models to make point forecasts.
  - One step and h-step
- Use MA models to make interval forecasts.
  - One step

Autoregressive Models

- Understand the fundamentals
  - Mean
  - Variance
  - Point forecasts
  - Interval forecasts
- Use AR models to make point forecasts.
  - One step and h-step
- Use AR models to make interval forecasts.
  - One step