

Information About Midterm 1

Week IV: Video 12

STAT 485/685, Fall 2020, SFU

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Video 12 Learning Objectives

In this video, we'll go over:

- Summary of what will be covered in Midterm 1
- What the midterm will look like
- How you can prepare for the midterm

What We've Learned: Ch. 1

Ch. 1: Introduction to Time Series (Video 2)

- Definition of a time series: Data obtained sequentially over time
- Some possible questions we might want to ask about a given time series
- Why we can't use standard statistical techniques (e.g. regression) for a time series dataset

What We've Learned: Ch. 2

Ch. 2: Fundamental Concepts (Videos 3, 4, 5 & 6)

- Relationship between a time series and a stochastic process
- Deriving the mean function, autocovariance function and autocorrelation function of a stochastic process

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- Random walk process, and its properties

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- Definitions of strict and weak stationarity, and the motivation behind them
- Checking whether a given process is stationary

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- Definitions of strict and weak stationarity, and the motivation behind them
- Checking whether a given process is stationary
- Rules on means, variances, covariances and correlations (in order to help you solve the above problems)

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Constant trend:

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- Recognizing some basic properties of the estimate for the constant trend term

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Constant trend:

- Estimating a constant trend term *by hand* and *from R output*
- Recognizing some basic properties of the estimate for the constant trend term

Linear trend:

- Estimating and interpreting the coefficients in a linear trend using R output
- Using estimates of the coefficients to estimate the mean at any given time
- Recognizing some basic properties of the estimates for the coefficients
- Understanding why the type of trend must be carefully chosen

What We've Learned: Ch. 3 (cont'd)

Seasonal trend:

- Estimating and interpreting the coefficients in a seasonal means model *by hand* and *using R output*
- Estimating and interpreting the coefficients in a cosine trend model using R output
- Using estimates of the coefficients (for either of the models) to estimate the mean at any given time
- Recognizing some basic properties of the estimates of the coefficients for the two models
- Identifying some pros & cons for each of the two models

What We've Learned: Ch. 3 (cont'd)

Model diagnostics:

- Goodness-of-fit measures: s , R^2 , adjusted R^2
- Understanding which assumptions R is making when fitting a trend
- Residuals: their definition and why they're useful
- Interpreting various residual plots: residuals vs. time, residuals vs. trend estimate, histogram of residuals, Q-Q plot of residuals
- Defining sample ACF, and interpreting its plot to judge whether the process appears to be white noise

What Midterm 1 Will Look Like

Thursday, Oct. 8th
4:30pm - 6:20pm

Logistics:

- The first half of the exam will be administered on Canvas, the second half on Crowdmark.
- There won't be any proctoring (Zoom, Proctorio, etc.).
- However, we will be communicating via Zoom throughout the exam! So **please join the usual practice session at 4:30pm** on Thursday, and stay joined the whole time. (You can mute yourself and turn off your video. But keep the sound on so you can hear me.)
- Please **be available for the entire time slot 4:30pm-6:20pm**.
- The exam will be approximately 1 hour long, but we will need extra time to set up, resolve technical issues, etc.

What Midterm 1 Will Look Like (cont'd)

Structure:

- Open-notes, open book.
- Broken up into a few parts, with a *time limit on each*.
- 5-minute break between parts.
- The first half will consist of a mix of multiple choice questions and short-answer questions (to be typed into Canvas).
- The second half will be *hand-written questions to be uploaded to Crowdmark*.
- There will be several different versions of the exam.
- I will be sending you a more detailed description of the exam in Week 5.

What Midterm 1 Will Look Like (cont'd)

Exam Policies:

- The exam will be synchronous, and students **must complete each part during the posted time**. There will be no alternative times for the exam.
- Students who miss an exam because of illness or for compassionate reasons must let me know within 24 hours after the exam date. Within four days the student must also submit a doctor's note or other relevant document.
- For rules on missing the exam, please see the Canvas page "Policies Regarding Midterm Exams and Final Exam".

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Academic Integrity:

- Exams will be done individually – **no collaboration, communication or teamwork is allowed!** This includes asking for help on the Internet.
- Please see SFU's Academic Integrity website (<https://www.sfu.ca/students/academicintegrity.html>) for more information on what is meant by academic dishonesty.

How You Can Prepare

What can I do to prepare?

- Watch/re-watch lecture videos 1-13.
- Try out lecture video quizzes again!
- Read textbook chapters 1-3.
- Go through Assignments 1 & 2, and their solutions (once they're posted).
- Try out exercises and examples in the book.
- Go over exercises the TA covered in tutorials.
- Go over exercises we did in practice sessions.
- (Tutorial material and practice session screenshots can be found in "Missed Something in Week x?" in each week's module.)

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What else is happening?

- Week 5 tutorial (M Oct. 5th) will be going over some review and exercises.
- There will be two instructor office hours in Week 5, as well as a bonus office hour with the TA. More info will be posted in the announcements.

Final Comments

That's all for now!

Good luck on the midterm!

In the Next Video: Review and Exercises for Midterm 1

Thank you!

References:

- [1] Cryer, J. D., & Chan, K. S. (2008). *Time series analysis: with applications in R*. Springer Science and Business Media.
- [2] Chan, K. S., & Ripley, B. (2020). TSA: Time Series Analysis. R package version 1.2.1.