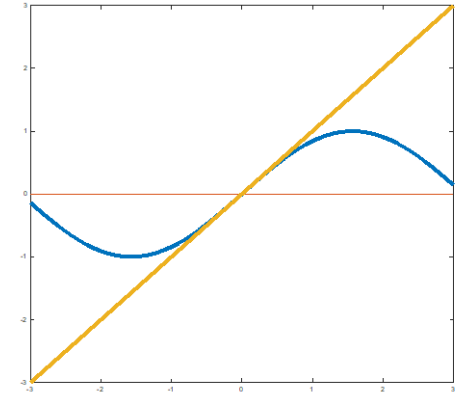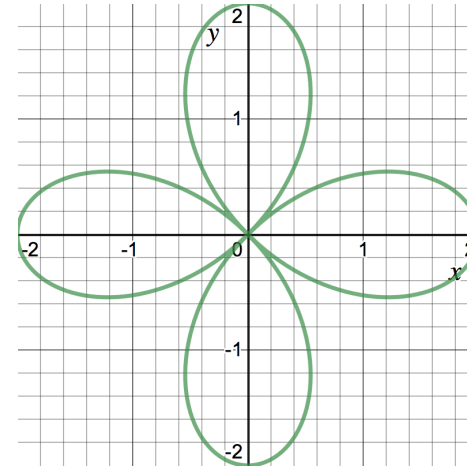# WPI Undergraduate Experience

- Flexibility with four terms per year

- Collaborating with faculty active in fundamental research (MQP)

- 1st year at WPI: **Mathematics,** Science, Humanities or Social Sciences

"Traditional" Calculus MA1021-1024

MA1021 – Derivatives and applications

MA1022 - Integrals and applications

MA1023 – Infinite Series, Parametric Curves, Vectors

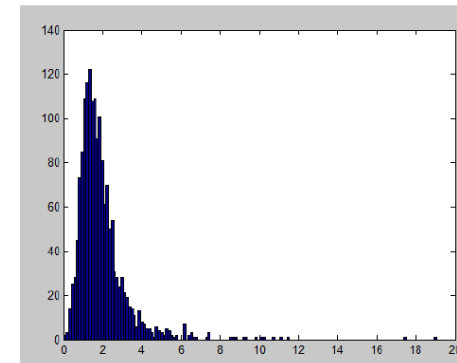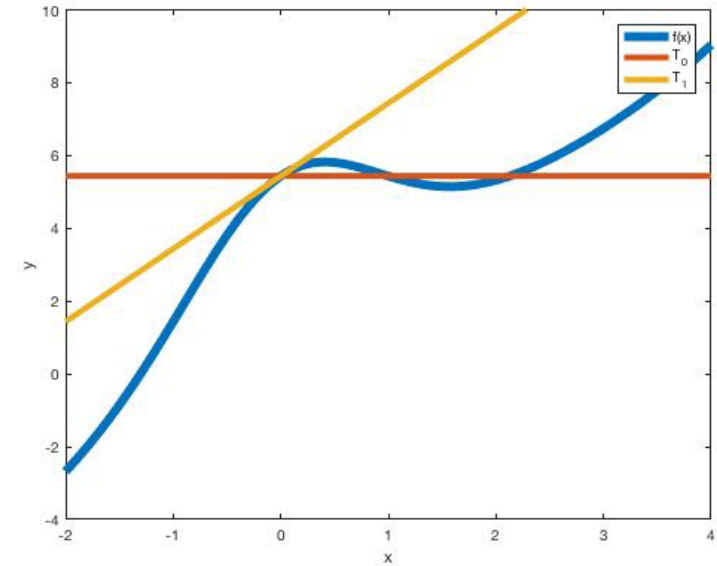MA1024 – Partial Derivatives and Multiple Integrals

All are term-length courses for 1/3 unit credit
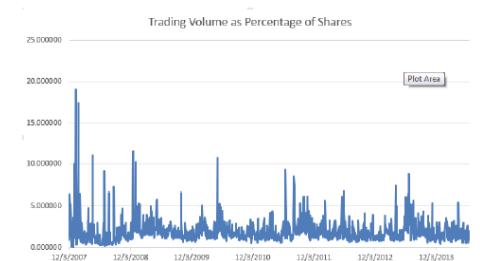
The Analysis Sequence

MA1033 in A term

MA1034 in B term

- Rigorous treatment of calculus III and IV (with proofs)

- Appropriate for math majors and those who want the theory behind the calculus

(a) Lognormal distribution

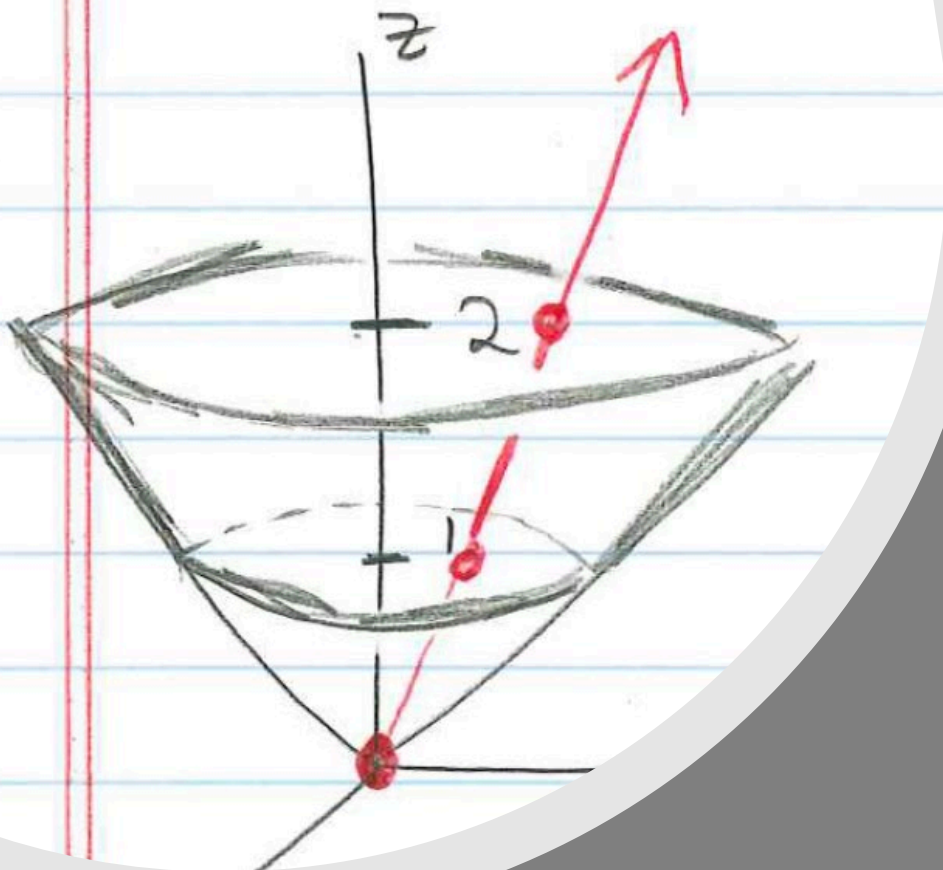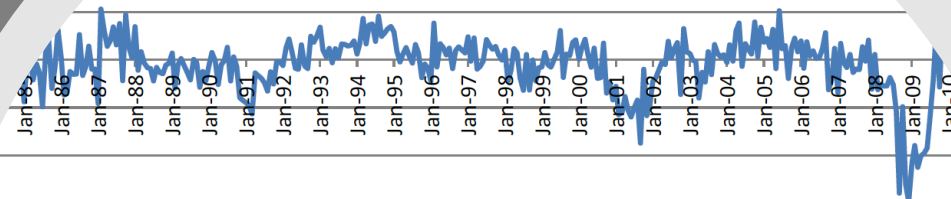(b) Trading Volume time series.

Retroactive Credit

- Get free credit for Calculus I if*
  - Take and pass Calculus II in first year
  - Take and pass Calculus III in first year

- Get free credit for Calculus I and II if*
  - Take and pass Calculus III in first year
  - Take and pass Calculus IV in first year

* No changes and no substitutes, no math NRs

US Index Using Lag Values, 1983-2013
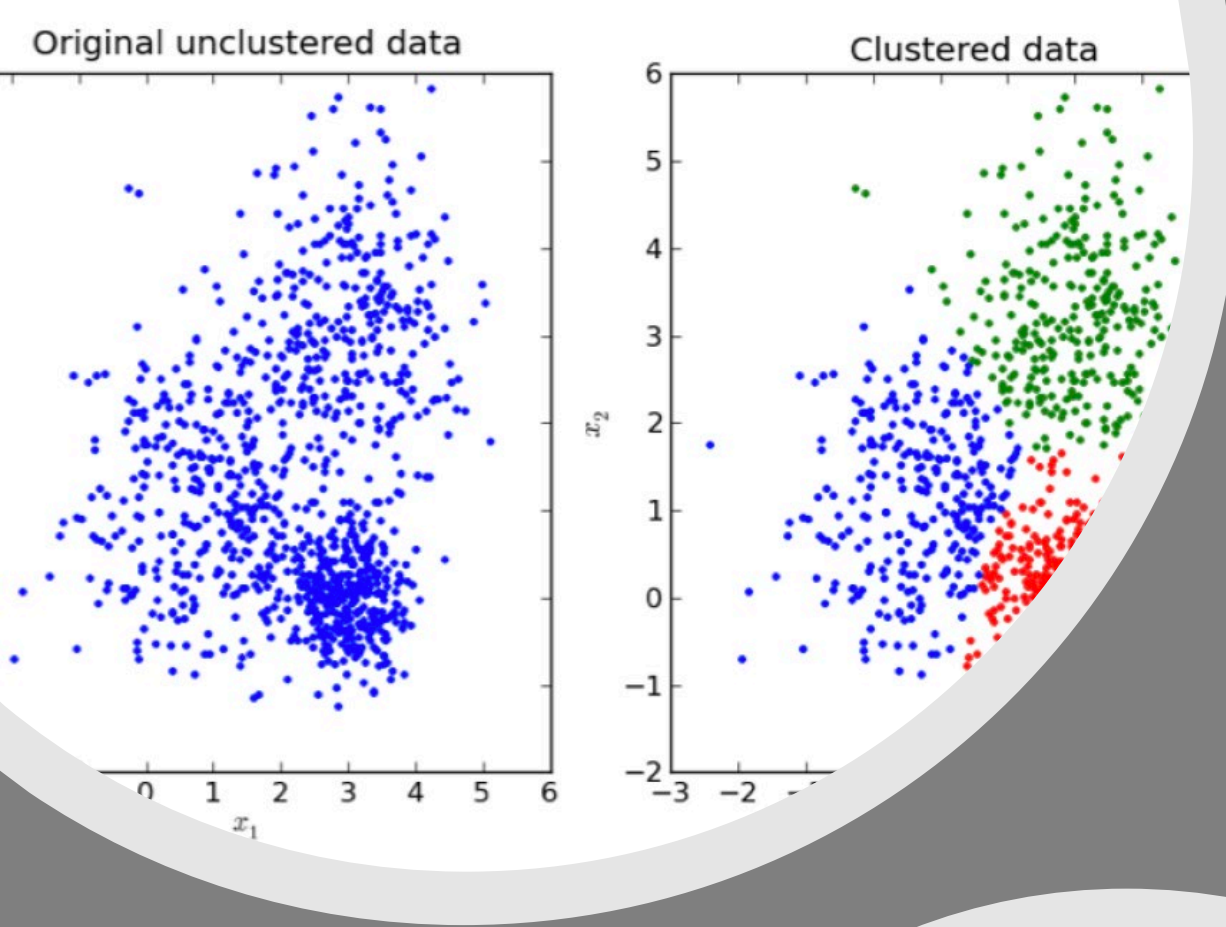
MA1971: Bridge to Higher Mathematics

- Introduction to mathematical thinking

- Develop mathematical logic and reasoning skills

- Learn to explain, justify, defend, disprove, conjecture and verify mathematical ideas

- Recommended for all
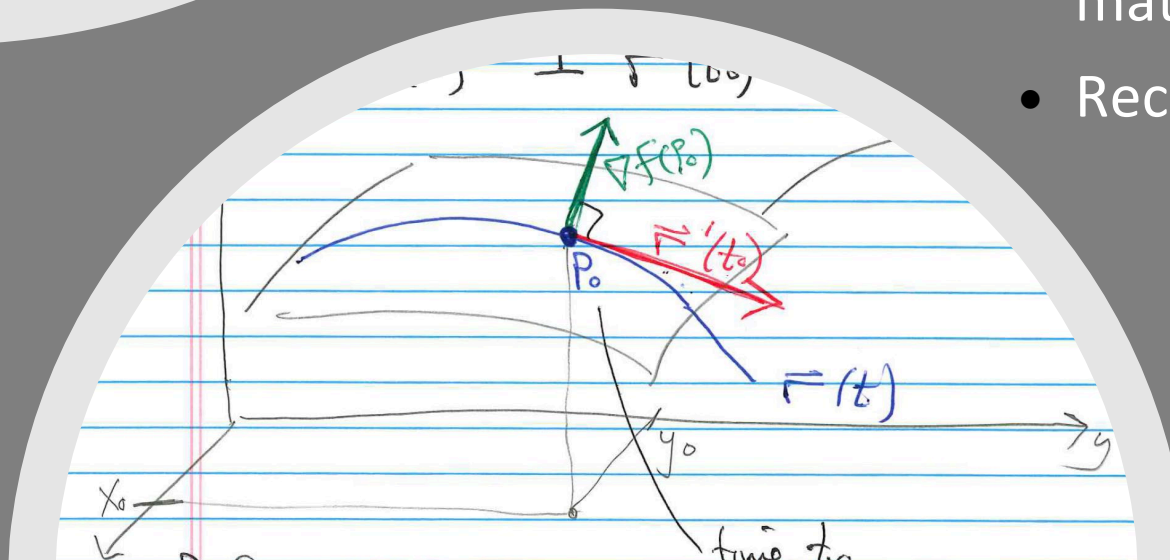
After the First Year

- Choose a Concentration… Transition Courses
  - Math Modeling with Differential Equations
  - Graph Theory, Combinatorics
  - Probability Theory
  - Linear Algebra II
  - Mathematical Statistics

- Upper-Level Courses for breadth and depth

- Major Qualifying Project as a capstone

Special Topics Courses and New Courses

- Analytic Number Theory (special topics)

- Spectra of Graphs (special topics)

- MA 464X - Introduction to Time Series Analysis (new course)

(b) Trading Volume time series.
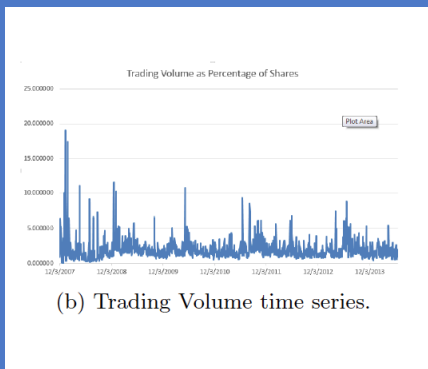
Actuarial Courses @ WPI

Theory of Interest (2 course sequence) (Exam FM)

- How much money do I need to put away today to pay you $100 per month for **5 years**?

Actuarial Mathematics (2 course sequence) (Exams LTAM, MAS-1)

- How much money do I need to put away today to pay you $100 per month for **as long as you live**?

Loss Models (2 course sequence) (Exams STAM, MAS-1, MAS-2)

- How much do I need to charge for car insurance to ensure I am 95% confident I can pay all the claims?

Introduction to Actuarial Ratemaking (Exams 5, 6, 8)

- What should I charge this year for car insurance given what we've seen over the last 5 years?

Actuarial Estimation of Unpaid Claims (Exams 5, 6, 7)

- Given we've already seen a $1,000,000 of car insurance claims this year, what should I expect the final total to be?

Topics In Actuarial Mathematics: special topics course to narrow in on concepts outside or beyond these courses that are either related directly to exams or other industry issues.

Actuarial Science

- Exam Completion:
  - Students graduate with 2 industry exams (on average) and other educational credit recognized by the SOA and the CAS (or VEE).
  - 25% of students complete 3 industry exams and VEE.
  - Record is 4 industry exams and the VEE.
- **Profs. Abraham and Posterro are Industry Professionals with the following credentials**
  - SOCIETY OF ACTUARIES (SOA: Life, Health, Disability)
  - CASUALTY ACTUARIAL SOCIETY (CAS: Home, Auto, Worker's Comp)
  - JOINT BOARD FOR THE ENROLLMENT OF ACTUARIES (IRS: Pensions)
  - CHARTERED FINANCIAL ANALYST INSTITUTE (CFAI: Investments)
  - GLOBAL ASSOCIATION OF RISK PROFESSIONALS (GARP: Investments)

Math Majors:
you are invited to MQP
"Pizza & Projects"

Learn more about and discuss MQPs in Mathematical Sciences and Actuarial Mathematics!

When? Thursday, February 24th
Time: 2:00 pm – 4:00 pm

Where? Unity Hall 520

Questions?
Email Prof. Randy Paffenroth (rcpaffenroth@wpi.edu) or
Prof. Fangfang Wang (fwang4@wpi.edu)
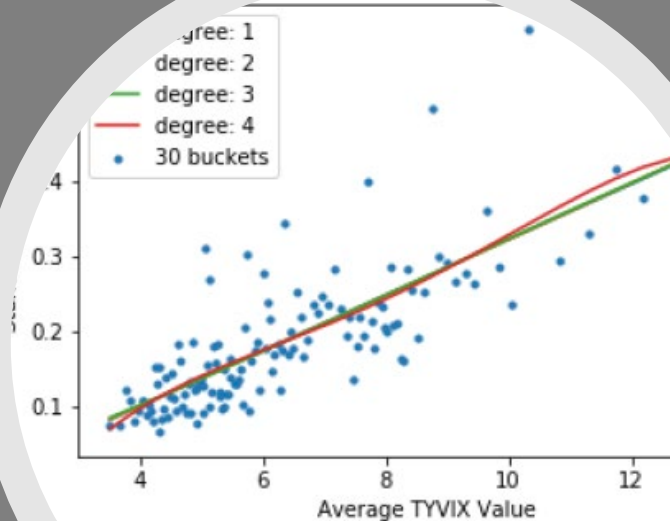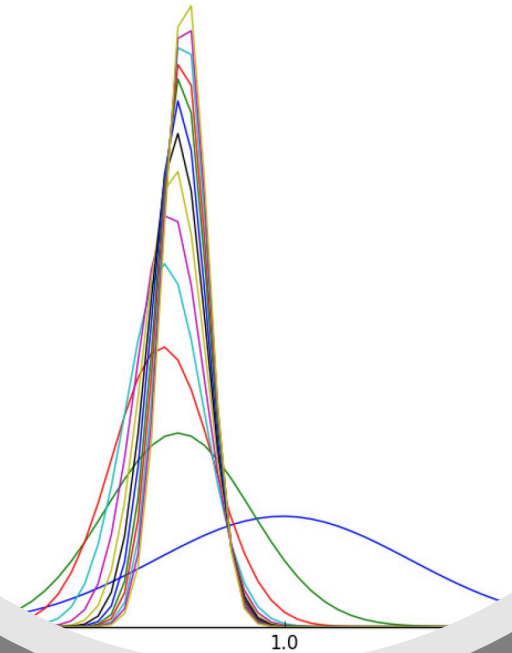
Major Qualifying Projects

MQPs

- Work closely with faculty advisor(s) on a research project

- 3 course equivalent

- Wide variety of research topics and opportunities for MQP's with industry sponsors

- Some MQPs result in publication

- https://www.wpi.edu/academics/departments/mathematical-sciences/major-project

$$_t \mathbf{c}_t + \mathbf{\Gamma}_t \mathbf{w}_t + \boldsymbol{\varepsilon}_t$$

$$_{t+1} = \mathbf{p}^T \begin{bmatrix} x_t \\ x_{t-1} \\ \vdots \\ x_{t-p} \end{bmatrix} + \eta_t$$

$$\mathbf{H}_t), \quad \eta_t \sim (0, \sigma^2)$$

Center for Industrial Mathematics and Statistics

- Build connections between academics, business, and industry

- Students work on real-world projects that come directly from industry, government and finance

http://www.wpi.edu/+CIMS

BS/MS Program

Apply in junior year

If accepted, can double-count courses to enable BS and MS in 5 years

Available for the following Math Sciences MS programs:

- Applied Mathematics
- Applied Statistics
- Industrial Mathematics

Mathematical Sciences @ WPI

- Please check out our department webpages for more info and make sure to check out videos by our current students!!

- Questions???

Math Mixer 2022!

Math Mixer 2022!

Math Mixer 2022!