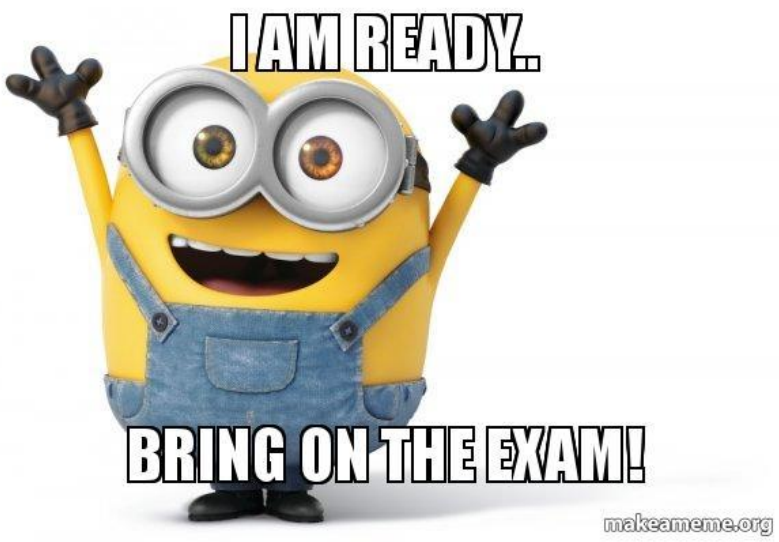
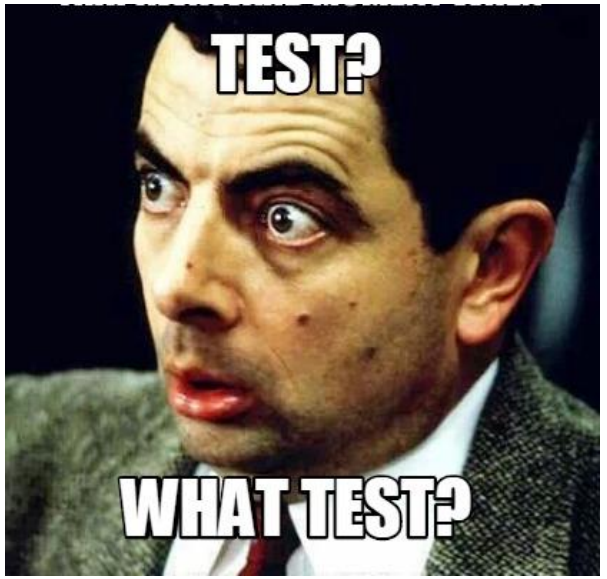
TEST 1: A REVIEW

Module 1: Dynamic Modeling





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RESOURCES

- APMonitor course
  - https://apmonitor.com/pdc/index.php/Main/ExamModeling

TEST INFORMATION

- **Date:** Monday Jan. 22
- **Time:** 1:30 pm
- **Location:** E6-2024 and E6-4022 (everyone come to E6-2024 first)
- **Duration:** 60 min.
- What can I use?
  - 1-sided 8.5” x 11” page of handwritten notes (digital handwriting is fine)
  - Calculator
  - Ruler
  - Basic writing supplies (e.g., pencil, pen, sharpener, eraser)
  - Scratch paper will be provided

WHAT IS FAIR GAME FOR THE TEST?

- Anything we have covered in class
  - Pay special attention to what we did on homework assignments and quizzes
- Problems cover the same concepts, but will not be the same problems with different numbers
- Coding is not part of the test, but you should be familiar with the concepts we discussed about them

RECOMMENDED STUDY STRATEGY

1. Review the completed lecture notes (pay attention to the learning outcomes)
2. Study the material provided on apmonitor.com/pdc for any concepts you need extra help with
3. Review the homework/quiz problems/questions and consider how they could be solved with different assumptions
4. Make your 1 page of notes
5. Try out the assignment problems on apmonitor.com/pdc that we didn't do
6. Try out the practice exam as though it was the real thing
7. Based on your performance, study more and come to office hours for help

TEST TOPICS

- Basics of process control
  - Where is it applied?
  - What are the basic elements?
  - Variable types
  - Core engineering steps
- Deriving dynamic balances
  - The 4 types of balances and how to apply them with different assumptions
  - The modeling recipe

TEST TOPICS

- Simulating dynamic systems
  - Familiarity with the basic workflow in using odeint
  - High-level understanding of how numerical methods are used by ODE integrators
  - Understanding of how to run and analyze different input tests
- Linearization of ODEs
  - Derive a linearized ODE for a SISO system using Taylor's series expansion
  - Compute a system's steady-state values
  - Understand limitations of linear approximations

TEST TOPICS

- FOPDT Models
  - Qualitative and quantitative understanding of the parameters
  - Derivation via linearization
  - Graphical method for fitting parameters to data
  - Optimization-based regression methods for choosing the parameters
- Model Regression
  - Basic understanding of using optimal least squares problems to choose parameters

QUESTIONS?

- The time is yours to ask me what you want to know
- Ask me
  - Questions about concepts that that still seem unclear
  - To go over particular problems from assignments or the practice test
  - Clarifying logistical questions about the test
- I will not answer questions about exactly what questions are or aren't on the test

BEFORE NEXT TIME

- Quiz 4: Due at 11:59pm
- Assignment 2: Due Monday (same time as Test 1)
- Study for Test 1
  - https://apmonitor.com/pdc/index.php/Main/ExamModeling