**Advanced Calculus Spring 2022 Final Project (updates in red)**

Summary: In lieu of a final exam, you may pick a topic from Advanced Calculus, prepare a lesson, teach it to the Advanced Calculus class (for practice), and then teach it to the AP Calculus class (during A6/7)

Steps:

* Choose a topic.
  + Your topic must be accessible for Calculus BC students. (So something like substitutions with Jacobians won’t work, because it relies too heavily on other prerequisite skills)
  + Once topics have been chosen, Mr. Malan will decide the order of presenting.
* Prepare a lesson which teaches your topic.
  + Introduce concepts and vocabulary
  + Connect to concepts from Calculus BC
  + Plan what you are going to say to explain your topic
  + Your examples may not come from Mr. Malan’s class notes. Feel free to look in textbooks or ask for help creating examples.
  + Give ***basic*** examples; Include pictures illustrating the topic
  + Prepare a “homework” assignment handout, which you will assign and collect, but which Mr. Malan will grade.
* Prepare assignment and answer key for your topic.
  + Can be straight from the book. For moderate/hard topics 2-3 problems is plenty. For simple computational skills (such as basic partial derivatives), give 4-5 problems.
  + Make then simple but with some variety. At least one problem should involve graphical understanding.
  + Use appropriate fonts/notations. This will require pasting small screenshots of book problems, or using equation editor. Format the assignment to be nice to write on.
  + On the 2nd page of the file, type the answers that you want to students to be able to give.
* Present lesson ***to the Advanced Calculus class*** or individually to Mr. Malan (for sake of time)
  + Present your entire lesson.
  + Be ready to answer tough questions.
  + Each of your classmates will give you helpful suggestions for improving the content and presentation of your lesson (this is part of their final project grade)
* Present your lesson ***to the AP Calculus*** class during A6/7, on May 25, 30, or June 2 (You will be assigned a day).
  + Dress and act professionally (smiling is okay; constant giggling/joking with the students is not okay).
  + Be ready to answer their questions.
  + You will have 35 minutes. Suggestion: 20 min teaching. 15 min “homework” and answering questions.
  + Biggest grading component: Excellent understanding and portrayal of calculus concepts (whether written, drawn, or spoken)

Possible Topics:

12.1 and 12.2 (combined) – Vector valued functions, velocity, and speed

\*12.4 – Tangent and Normal Vectors

13.3 – Partial derivatives of functions of two variables (including visual)

\*13.4 – Differentials (with approximation applications)

\*13.6 – Directional derivatives and gradients

\*13.8 – First and second derivative test for critical values

14.2 – Double integrals and volume (don’t have to define vert/horiz simple)

\*14.3 – Polar double integrals and volume

\*14.5 – Surface Area

15.1 – Intro to vector fields with 2d curl and 2d divergence

If you wish to teach a topic that requires prior knowledge (marked with \*), it will only be approved if someone else is teaching the “prior knowledge” section.

Key Dates:

May 23, 24, 26 – Practice presentations

May 25, 30, June 2 – Real presentations. Everyone comes on June 2.

