Project 8 [6 FP "Fluency Points"]:

Predict the Vibration of a Building during an Earthquake Using 1-DOF and 2-DOF Models
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Description:

In a written technical memorandum *and* a Google Sheet:

- Identify a real-life skyscraper located anywhere in the world, particularly if facts such as height, mass, materials etc. are readily and publicly accessible
- Predict the vibration of this building during an earthquake by using:
  - 1-DOF model, and
  - 2-DOF model
- Build a Google Sheet that
  - allows the user to easily specify mass or masses, earthquake amplitude, damping coefficients, and other parameters necessary for calculating equivalent stiffness
  - calculates the natural frequency or frequencies of each model
  - plots the vibration response of both models in a single chart
- Make a comparison of the two models, state the pros and cons of using each model, and evaluate the need for MDOF vs. 1-DOF assumptions
- Reflect on your journey of working on this project

Deliverables:

Present your work in a typed technical memorandum (tech memo; PDF only) and a Google Sheet.

Rules and Formatting:
- This is an individual project, to be done by you and you alone
- The tech memo must be typed, except for sketches and equations where handwritten work may be included
- Wikipedia is an unacceptable reference
- Content and file requirements
  - Your tech memo must contain the entirety of your work for this project, including vibration modeling and mathematical formulation, results and a plot from your Google Sheet, conclusion, and reflection
  - Your entire tech memo must be in portrait orientation and has a vertical page flow
  - Your Google Sheet must be publicly accessible, i.e., no special permission required
  - Your Google Sheet must not be edited after you have submitted it to Gradescope (your Google Sheet will show the last edit date to any viewer, so be sure not to

modify it after submitting!)
- Google Sheet functionality requirements
    - Your spreadsheet must include instructions for the user
    - It must allow the user to quickly change values of the parameters described above
    - It must contain a plot that dynamically updates whenever an input value changes
    - It must have only one tab (or "sheet"); all input parameters (constants), data, and plot must be shown in the same tab/sheet

Submission:

Submit your tech memo PDF *and* your Google Sheet URL in Gradescope only. Submissions by email or other means will be disregarded.

Due on Dec 3, 2021 (Fri), at 11:59 pm CST.

Late submissions will be subject to the "half-life" reduction policy according to the syllabus.

Grading Rubric:

	Fluency			Scaling	Max Possible
	2	**1**	**0**		
Technical Rigor	Tech Memo: Assumptions are reasonable and not oversimplified; physics, math and data are accurate and convincing; references cited are credible Google Sheet: Data are generated using the correct equations; plot is accurate and based on the generated data	Some obvious details missing; questionable references	Farfetched, or missing most or all details	1	2
Professionalism	Tech Memo: Presentation of work is logical, legible, and easy to follow; format is well-structured; free from grammatical or typographical errors; a joy to read Google Sheet: Instructions and annotations for the user are clear, changing parameters is easy, plot is well formatted	Some obvious issues with coherence and/or format	Full of errors; hard to follow; illegible	1	2
Rationale, Justification, Reflection	Conclusions are insightful, thoughtful and transparent; goes beyond "pointing out the obvious"; reflection is thoughtful and authentic, and suggests future (self-)improvements	Insubstantial or vague	Missing altogether	1	2
				Max Possible:	6