1. This problem was for a different semester when we were using a book about MEMS. If you’ve already done it with the Jaeger textbook, that’s fine. If not, use this online textbook: http://www.sciencedirect.com/science/referenceworks/9780444521903

Skim through the book. Find five different sections, figures, tables, applications, that intrigue you. List each one and write at least one sentence describing why you find it interesting.

2. Watch this video https://www.youtube.com/watch?v=32HXIchQgsw of an electrostatic motor made in a single-mask SOI process
   a. What is the approximate layout area? (there’s a scale bar in the first pictures of the motor)
   b. Estimate the min and max capacitance of the differential capacitive sensor shown at 0:25. Assume a 50um thick SOI layer, and estimate gaps from the scale bar. Estimate the total displacement, or travel. Estimate dC/dx
   c. The electrostatic stepper motor is shown at 0:45. Estimate the maximum capacitance of a single pair of opposing fingers, and the max dC/dx per finger pair.

3. Watch this video https://youtu.be/FfH24G_NT8M of a Sandia safe/arm device made in a multi-layer polysilicon process. There are five comb-drive motors in this device. Three are shown. Find them.

4. In the figure below, the structure on the left is the pattern on a mask. The beam and fingers are 1µm wide. All plates are 10x10µm². The holes in the lower plate are 1µm square on 2.5µm centers. The gap between the fingers is 1µm.
   a. Draw the process cross-section after 15 seconds of SiO₂ etching.
   b. Draw the cross-section after 1 minutes of SiO₂ etching.
   c. On a top-down view of the structures, sketch where you think there would still be oxide after a 1 minute etch, assuming that the numbers 1 and 2 really are etched into the SCS. Think carefully about the perforated plate!
   d. Estimate the capacitance between the fingers of structure 1 and the fingers of structure 2.
5. [ee247] Calculate the capacitance between structure 2 and the substrate. How small does the gap between the fingers need to be before the capacitance of structure 2 is larger to structure 1 than to the substrate?