Open Ended Problem #8 Star Wars Group work okay, Due 11/15/23 at beginning of class (Don't be afraid to "Google" for reasonable assumptions; just provide references!)

That's no moon...

Having created the ultimate superweapon, the Empire boldly crosses the galaxy obliterating planets and opposition. According to Han, the power to obliterate a planet is greater than that of the entire Imperial Starfleet. So, was the Emperor wise in commissioning this superweapon, or should he have just doubled the size of the fleet? To answer this question, you are to estimate the cost of producing the Death Star. In order to do this, you will estimate the required materials and fabrication costs of the Death Star. As material scientist familiar with formation methods for polymers, metals, and ceramics, you are well prepared for this task. To help, I'll give you a couple of assumptions: first, assume that there 4 categories of materials that you need to estimate: 1) shielding on the outside of the station, 2) structural framework (beams and pillars), 3) Floor plating, and 4) wall coverings. For each of these categories, determine the ideal material, the ideal fabrication technique, and the cost of both material and fabrication. Use this to determine the cost, in 2023 US dollars, of the Death Star.

1) What is this problem actually asking for? What is the final value you are being asked to find?

- 2) Draw sketches or plots that indicate the actual problem scale and scope.
- 3) a) What physical laws apply to this problem?
 - b) Indicate equations, correlations, and/or formulae that can model these laws.
 - c) What are the potential limitations of these equations?

4) What assumptions should be made to utilize the equations/correlations/formulae listed in part 3b?

a) List ALL the assumptions that you need to in order to solve the problem.

b) Justify your assumptions (*references*, reasoning, judgment, common sense, etc.)

5) What are the physical properties (list assumed or referenced values) used in this problem?

- 6) What is the cost of the death star in 2023 USD?
- 7) Verify your answer... Does it look reasonable? Anything odd about the calculation?
 - a) Now, let's compare this to the cost of gather firepower differently. How much would it cost to double the size of the Imperial Fleet?
 - b) Which is a better choice for expanding your absolute power?