

Open Ended Problem #6
The Amazing Spider Man
Group work okay, Due 10/25/23 at beginning of class
(Don't be afraid to "Google" for reasonable assumptions; just provide references!)

[So... could a spider pull a jet?](#)

Of all the Spiderman movies (of which there are MANY), this one is perfect for us, because Peter actually develops web shooters, rather than having his DNA do this for him. Spiderman webbing is of course a polymer, and there are some interesting claims made (or shown) in this movie. In particular, using this clip and supporting references, determine a) the yield strength of Spiderman webbing, b) the thickness of this silk “cable” that naturally occurs, and c) the diameter needed of a Spiderman silk strand that will just support Peter while swinging from a skyscraper in New York.

- 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 and the spider silk properties of interest.
- 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 are the yield strength, natural strand thickness, and peter-swinging thicknesses of Spiderman silk?
- 7) Verify your answer... Does it look reasonable? Anything odd about the calculation?
 - a) How does the answer change if one of your key assumptions in part 4 a is modified by +/- 50%?
 - b) Does this change have a large impact on the properties of Spiderman webbing?
 - c) Chose the second most important (in your view) assumption from 4 a and either oppose this assumption or change this assumption by +/- 50%?
 - d) Are there any other challenges associated with swinging through a city on a strand of spider silk?