Open Ended Problem #1
Warp Speed
Individual work only, Due 1/17/23 at beginning of class
(Don't be afraid to "Google" good assumptions!)

Star Trek Voyager Clip

In the Star Trek universe, humans traverse the galaxy by traveling at "warp speed". This is somewhat of a misnomer, however, since movement at faster than light speeds isn't possible. Rather, for warp speed, space is "bent" or warped, allowing for a ship to move along a shortcut between two points in space at sub-light speeds. The resulting combination of warped space and sub-light travel is a relative velocity that exceeds to the speed of light if traveling along un-warped space. Based on the "Star Trek Voyager" clip shown above and characteristics of relativity, at what speed is the starship actually traveling, neglecting the considerations of warped-space?

1) What is this problem actually asking for? (think of things we have discussed in class)

2) Draw a sketch depicting the conditions 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?

3) What assumptions should be made (don't include tabulated properties or numbers, this will be included in part 5)?
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 property values you will use in this problem?

6) Calculate the quantities that you listed in part 1

7) Verify your answer... Does it look reasonable?
a) At this speed, is it likely that relativistic effects dominate? Why or why not?
b) Does this elongation make sense under relativistic characteristics?
c) How would traveling at this speed change the time passage of the crew, relative to a stationary observer?