1. The distance to the nearest star, Proxima, is 4.22 light years. Given that light travels 300 million meters per second \((3 \times 10^8 \text{ m/s})\), and that there are 365 days in one year, calculate the distance to Proxima in meters.

2. Suppose that you want to build a space ship that will take you to Proxima. Decide how long you wish the one-way journey to be; it can be minutes, or decades, or whatever you choose. Express your answer in seconds of time.

3. Figure out what your average speed of travel must be, by dividing the length of the one-way trip (from step 1) by the duration (from step 2). You can leave your answer in meters per second.

4. Make a list of what you want to bring along with you, including friends, food, and equipment (the “payload”). From this list, estimate how heavy your total payload would be. Express your answer in kilograms (there are 2.2 pounds in one kg).

5. Now figure out how much kinetic energy will be required to deliver your payload to Proxima in the time you requested. You can use the standard expression for kinetic energy,

   \[
   \text{kinetic energy} = \frac{1}{2} \times \text{payload mass} \times \text{speed}^2.
   \]

   Your answer will be in units of joules.

6. A gallon of gasoline contains about \(1.3 \times 10^8\) joules. How many gallons of gasoline would you require to produce the amount of energy required for your trip? A typical supertanker can haul 84 million gallons; how many supertankers of gasoline are required? Recall that we did not add in the mass of this fuel to the mass of the space ship, and have to carry this fuel with us.

7. Gasoline is a relatively inefficient fuel, when compared with atomic energy. The energy in an atomic bomb is about \(10^{14}\) joules. How many atomic bombs would be required?

8. Overall, how likely is it that this rocket will be built?

9. Given these energy considerations, how likely is it that alien beings from distant stars are present on Earth?

Requirements for a good assignment

- The assignment is not a group project. All work must be completely original. The assignment will be graded strictly, as expected for a 400-level course. All assignments are weighted equally.
- Have your name, SID, and a word count at the top of the paper. Use question-and-answer format when writing your assignment, do NOT hand in a run-on paragraph (50% penalty).
- Be typed, double-spaced, and within the word limit. Assignments longer than the word limit will receive zero credit. Equations and diagrams can be hand written.
- Reference all sources of information you use.
- Use quotations only to illustrate your point, not to make it. If you are unclear about this requirement, then speak with the instructor.
- Show completeness of information, conciseness of expression, have a logical development of ideas, and evidence of thought regarding the content.
- Be professional of presentation, e.g., no ragged ends, creases, or ink blobs on the paper.
- In all ways, show pride in your work.