



Mission to Mars - What's for Dinner?

We're going to Mars! Since well before humans actually set foot on the moon there has been the dream of colonizing a new planet. In 1948, noted scientist Wernher von Braun wrote a technical guidebook outlining a manned mission to Mars. To this day, scientists and engineers at NASA and other space agencies and companies refer to *Das Marprojekt* in their quest to travel to Mars. Plans for the journey are well underway and far reaching. NASA landed the Mars Perseverance rover in Mars' Jezero Crater on Feb. 18th. As a stepping-stone to a manned flight to Mars, NASA has plans for a 2024 manned mission to the moon.

Prior to the first manned flight to Mars, unmanned missions will transport supplies for habitats and food. Sustaining life on Mars requires satisfying five basic human needs: food, clothing, shelter, oxygen, and water. The Challenge Problem will focus on creating a plan to satisfy food requirements using mathematical modeling. You must address the following:

1. Flight Crew:
 - a. What demographics and individual characteristics must be **considered** when deciding on the crew for the first landing party?
 - b. Create a flight manifest (including the number of individuals and the individual characteristics each one would satisfy) for the first flight to Mars.
2. Food: The food system must be nutritious and appetizing to support crew health and performance for the entire mission. This will require a variety of food as crew members on the International Space Station have reported menu fatigue. Using mathematical modeling, justify your menu choices based on **variety, cost, and nutrient requirements** for the following:
 - a. What will be the optimal food supply waiting on Mars for their arrival in order to establish the colony?
 - b. What optimal food supply must be taken on the first flight to sustain the crew for travel from Earth to Mars?
 - c. Food and additional crew members will be sent from Earth at regular intervals. What is the optimal plan for food to be sent from Earth to maintain the colony?
 - d. Some scientists predict that 10% of the food consumed on Mars can be grown to supplement the food sent from Earth. What is the optimal plan for food to be grown on Mars?