

St. Francis Xavier University
Department of Computer Science
CSCI 435: Algorithms and Complexity
Linear Programming — Discussion Questions
Winter 2025

[Dan91] George B. Dantzig. Linear Programming: The Story About How It Began. In J. K. Lenstra, A. H. G. Rinnooy Kan, and A. Schrijver, editors, *History of Mathematical Programming: A Collection of Personal Reminiscences*, pages 19–31. North-Holland, Amsterdam, 1991.

George Dantzig was an American mathematical scientist whose work spanned the areas of mathematics, statistics, operations research, and optimization. He began his career in industry, working for the United States Army and the RAND Corporation, before joining the University of California Berkeley and, later, Stanford University, as a professor. Dantzig made many fundamental and groundbreaking contributions to mathematics and its applications, and his work was recognized with a number of honours and awards.

1. Dantzig describes linear programming as “part of a great revolutionary development” in planning and decision-making. How did World War II and the post-war period contribute to the emergence and growth of linear programming? Why does it seem like this era was the right time for its development?
2. What were some of the main barriers to optimization-based planning prior to 1947, and how did Dantzig’s (and other’s) work overcome these barriers?
3. Dantzig gives an example of “assigning 70 men to 70 jobs” to illustrate the infeasibility of a brute-force approach. What about this problem makes brute-force infeasible, and why was his simplex method considered a breakthrough? How does the simplex method compare to other polynomial-time linear programming algorithms mentioned in the article?
4. Computers were a vital part of making linear programming algorithms practical. How has the role of computing in optimization changed since the 1940s and ’50s? What challenges remain today in solving optimization problems?