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Systematic Pedagogy for More Than Two Variable Linear Programming Solutions Using Excel

N. Al-Fouzan[1], J. Lee[2], T. J. Lovejoy-Henkel[1], D. Parsons[3], and R. Yearout[1]

[1]Department of Management & Accountancy
The University of North Carolina at Asheville
One University Heights
Asheville, North Carolina 28804 USA

[2]Department of Mathematics
The University of North Carolina at Asheville
One University Heights
Asheville, North Carolina 28804 USA

[3]Departmentof Business
Mars Hill University
Mars Hill, North Carolina 28754 USA

Corresponding author's Email: yearout@unca.edu

Author Note: Nagi Al-Fouzanwill graduate from the University of North Carolina Asheville with a degree in Business Administration Management in December 2014, Jimin Lee, Assistant Professor of Statistics, has published many articles in statistics and bio-statistics. She has also had part in published international industrial engineering journals and conference proceedings. Thomas Lovejoy-Henkel graduated from the University of North Carolina Asheville with a degree in Operations Research Management in May 2014. Donna Parsons, Assistant Professor of Business, has published numerous business articles as well as in industrial engineering journals and proceedings. Robert Yearout, Professor of Industrial Engineering and Management, has published a significant number of articles in national journals and proceedings.

Abstract: Industrial engineers, operations managers, and those engaged in daily business operations use linear programming to obtain optimal solutions to a wide range of day to day problems. Over the past ten years, simple and inexpensive operations research software that is user-friendly to the mentor, student, and instructor is becoming difficult to obtain. This is especially true since Emmons, Flowers, Khot, and Mathur's STORM 4.0 for Windows is obsolete and is no longer in print. Excel recommends *Excel Solver* outsourced software to solve linear programming problems. However, it does not meet the requirements for education, application, and practice. The systematic pedagogy discussed in this paper was developed by solving a two-variable problem. This includes decision variables, costs, constraints, resources, slacks, and criteria for optimization. The optimal solution was then evaluated using the SIMPLEX method, graphical method, and operations research software. Once the Excel method was determined to be a valid method, a three variable, five constraint maximization problems was solved. Then minimization problems were solved with very little modification. This iterative process followed the rules of the SIMPLEX Method. A step-by-step systematic pedagogy was then developed to explain the model's application in problem solving and to assist the user. The resulting pedagogy was satisfactorily tested in basic management science/operations research, production operations, and advanced operations research courses. The major advantages are: (1) element of the analysis can be addressed and easily understood, and (2) for the practitioner, engineer, instructor, and student, Excel is readily available on all personal computers internationally.

Keywords: Linear Programming, Pedagogy, Excel