

Complex Problem Solving Using Excel and LaTeX

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1 Introduction

In this document, we explore complex problem-solving techniques in Excel and provide three distinct applications using various literature sources. We illustrate these through detailed tables, highlighting computational challenges, solutions, and key literature.

2 Application 1: Financial Modeling

Financial modeling in Excel often involves analyzing large data sets to compute net present values (NPV) or internal rates of return (IRR) under various assumptions.

Year	Cash Flow (\$)	Discount Rate (%)	Present Value (\$)
1	5000	10	4545
2	7000	10	5785
3	10000	10	7513
4	12000	10	8191

Table 1: Cash Flow Analysis and Discounting [damodaran2012investment]

This table shows a simple discounting mechanism for financial models. In reality, Excel tools such as Data Tables and Goal Seek help to evaluate these figures in much larger, dynamic scenarios.

3 Application 2: Statistical Analysis

Statistical analysis in Excel helps in performing regression analysis, hypothesis testing, and descriptive statistics. This is useful in fields like psychology and social sciences [cumming2012understanding].

Group	Mean	Standard Deviation
Control Group	50	5
Experimental Group	60	4
T-Test Statistic	2.31 (p < 0.05)	

Table 2: T-Test for Comparing Groups [field2013discovering]

This table compares means between two groups, with Excel’s data analysis tools performing T-tests to determine statistical significance.

4 Application 3: Optimization Problems

Optimization problems, such as linear programming, are commonly solved in Excel using the Solver add-in [vanderbei2013linear].

Variable	Lower Bound	Upper Bound
x	0	100
y	0	80
z	0	50
Objective Function	Maximize Profit: $10x + 20y + 15z$	

Table 3: Optimization Problem Variables and Bounds [boyd2004convex]

This table illustrates a simple optimization problem where Excel’s Solver can be applied to maximize profit while staying within constraints.