Chapter 3: Art of Optimization

# LP Example: Portfolio Selection Problem

## Corresponding reading: Chapter 3, Page 2

### Purpose: Formulating and solving an LP for the portfolio selection problem in a real-world setting.

An investment company is considering investing $1,000,000 into the following five alternatives. For each alternative, the corresponding expected return and the risk score (from 1 to 10) is given in the following table. The company wants to find the best possible investment.

|  |  |  |
| --- | --- | --- |
|  | Expected Return (%) | Risk Score |
| Mine Industry | 20 | 2 |
| Construction | 17 | 5 |
| Transportation | 24 | 3 |
| Precious Metals | 30 | 6 |
| Start up Support | 36 | 8 |

1. How do you recommend this company to formulate this problem as a linear programming problem? You need to think about what the most reasonable way is to formulate this problem. You might need to consult the internet. You can use any arbitrary value for additional parameters that you might need. You can also consider any additional assumptions you might need. Make sure to report any additional parameters or assumptions you consider.

Hint: After thinking deeply about the problem, you need to follow these steps:

* Identify the objective function (goal of the problem)
* Identify the constraints
* Define decision variables
* Formulate the problem (i.e., write the objective function and constraints in terms of the decision variables)

1. Use Excel Solver to solve the problem based on your formulation in part (a). Remember to generate the Answer and Sensitivity reports.
2. Use the Sensitivity Report to conduct sensitivity analysis on at least two constraints and two decision variables.

***Note:*** *Understanding the case and what you need to do is PART OF THE CASE. If you do not understand a specific part, or are not sure what you should do, you need to review the corresponding reading section in the text before asking for help. You might also need to do some search on the internet. That is all part of the case and your learning process.*