Homework #1: Mathematical Modeling Review

Funding 'R Us is considering four different investments: Investment A yields a net present value (NPV) of $16,000; investment 2, an NPV of $22,000; investment 3, an NPV of $12,000; and investment 4, an NPV of $8,000. Each investment requires a certain cash outflow at the present time: investment 1, $5,000; investment 2, $7,000; investment 3, $4,000; and investment 4, $3,000. Currently, $14,000 is available for investment. Formulate an mathematical programming model whose solution will tell Funding 'R Us how to maximize the NPV obtained from investments 1–4. (*Hint:* You can only decide whether to invest in an invest or not. You are not able to decide how much to invest.)

1 Concrete Model:

Formulate the investment problem above as a **concrete** mathematical programming model. Clearly define and describe all decision variables, constraints, and the objective.

2 Abstract Model:

Formulate the investment problem as an **abstract** mathematical programming model. Clearly define and describe all sets, parameters, and decision variables.

3 Python/Pyomo:

Model and solve the **abstract** mathematical programming model above using Pyomo.