1. You have $100,000 to invest in a Portfolio consisting of securities $A$, $B$, and $C$. The three securities have the same average return, but they have different standard deviations given by $\sigma_A = 0.05$, $\sigma_B = 0.04$, and $\sigma_C = 0.03$. How much money would you invest in each of these securities to minimize the variance of your portfolio if the returns of the securities are independent?

2. Assume that the utility function of two individuals are increasing concave.
   a. Would they ever agree to bet on the outcome of a toss of a fair coin? Why?
   b. Would they ever agree to bet on the outcome of a ball game? If so, what can you say about their subjective probabilities of winning the bet?

3. According to the Portfolio Theory risk is reduced by
   a. Investing in uncorrelated securities.
   b. Investing in negatively correlated securities.
   c. Both of the above.

4. Under the assumptions of the Capital Market Theory, individuals will:
   a. Invest on different risky portfolios.
   b. Invest on the same risky portfolio.
   c. Invest on the risk free security in combination with different risky portfolios.

5. Janet Smith has $3,000. Three investments of $1,000 each will generate the cash flows given in Table 1. Ms. Smith wants to consume $1,500 at the end of Year 2 and $1,500 at the end of Year 3. Ms. Smith wants to maximize present consumption while meeting consumption objectives for future years. Formulate a linear program to determine Ms. Smith’s portfolio of investments assuming that she can borrow or lend money at 10%. Fractional investments are allowed.

6. Technicraft is considering six independent projects. The company is operating under pure capital rationing. Only budgetary constraints are applicable, and any portion of the available budget unused in Year 1 cannot be carried over to the following year. It is assumed that Technicraft is expected to be affiliated with these projects for a period of three years.
Technicraft’s financial analyst calculates the net present values and the expected outlays for each project based on pertinent data (not shown here). The results are summarized in Table 1.

It is further assumed that both net present value and outlays for each project are directly proportional to the fraction of the project to be funded. For example, when the net present value of Project 1 is $15,000, then the net present value of one-third of this project is $5,000.

Technicraft has available for investment $35,000 in Year 1, $20,000 in Year 2, and $21,000 in Year 3. Let $x_i$ be the fraction of Project $i$ to be funded.

- Formulate an LP program with all values in thousands of dollars.
- Add a constraint to reflect the fact that Projects 1, 3, and 6 are mutually exclusive.
- Add a constraint to reflect the fact that Project 4 will be accepted only if Project 1 is accepted.
- Modify the formulation to allow budget deferrals, i.e., to allow the unused part of the budget in Year 1 to be used in Year 2 etc.