1. A company that has three power generating units to supply your consumption of it. Each ith unit of energy generates a power of xi Megawatts (Mw) where i = 1, 2, 3. The energy demand of the company is 952 Mw. Further, running each of these three units has different costs, which are represented by the following functions of monetary costs of energy generation per hour of each unit:

$$f_1(x_1) = x_1 + 0.0625x_1^2$$
$$f_2(x_2) = x_2 + 0.0125x_2^2$$
$$f_3(x_3) = x_3 + 0.0250x_3^2$$

What should be the power generation scheme for each of the three units in such a way as to minimize the company's total cost per hour of energy? What is the minimum monetary cost achieved?

2. Let the vector $\mathbf{v} = (2, 3, 1) \in \mathbb{R}^3$. Let $\mathbf{u} \in \mathbb{R}^3$ be any possible unit vector. For which of all the possible **u** is the maximum value of **u** · **v** obtained?

3. Solve the following optimization problem.

$$\underset{(x,y)}{\text{Min}} \quad f(x, y) = x^2 - 2y$$

$$\text{sujeto a} \qquad x^2 + y^2 \leq 1,\ x \geq 0,\ y \geq 0$$