1. A rectangular tank is open at the top and it is designed to hold $1m^3$ of liquid. Find the sides of the base and the height for which the total area of the bottom and the four sides of the tank is a minimum.

2. A farm erects a fence along three sides of a rectangle in order to make a sheepfold; the fourth side of the rectangular is provided by a hedge already in existence. Find the maximum area of the enclosure thus made if the total length of the fence is to be $80m$.

3. If the area of a closed rectangular box is given, find the dimensions of the box when its volume is a maximum.

4. Find the coordinates of point (points) $P(x, y)$ on the plane (x, y) for which the square sum of distances of it from the points $P_1(1, 3), P_2(5, 4), P_3(-1, 2)$ is a minimum.