

One method to find the maximum of a multivariate function  $f(x, y)$  is called the Steepest Descent Method. Here we start at a given point  $(a_0, b_0)$  and select the direction of the maximum slope at  $(a_0, b_0)$ . Then we follow that maximum slope direction till we get the maximum along that direction as a one variable function, say at  $(a_1, b_1)$  and we repeat the process. Show that the maximum directions at  $(a_0, b_0)$  and  $(a_1, b_1)$  are perpendicular. If  $f(x, y) = x^3 + 3xy^2 - 75x - 9y^2$ , write the first two steps of the Steepest Descent Method starting from  $(0, 0)$ . Write a code and find the point we get.