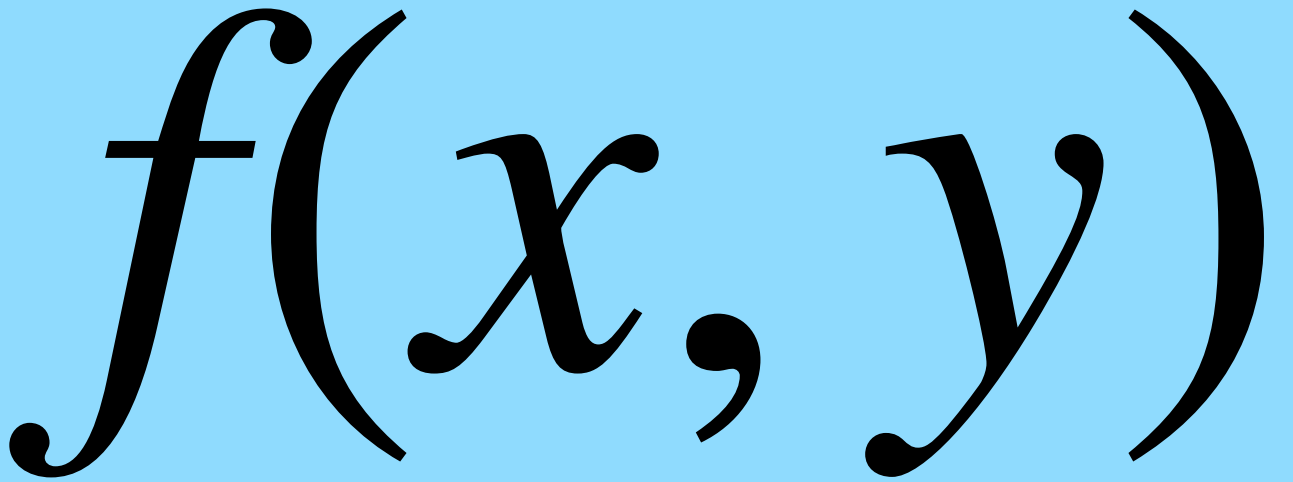
What is a Constrained Optimization Problem?

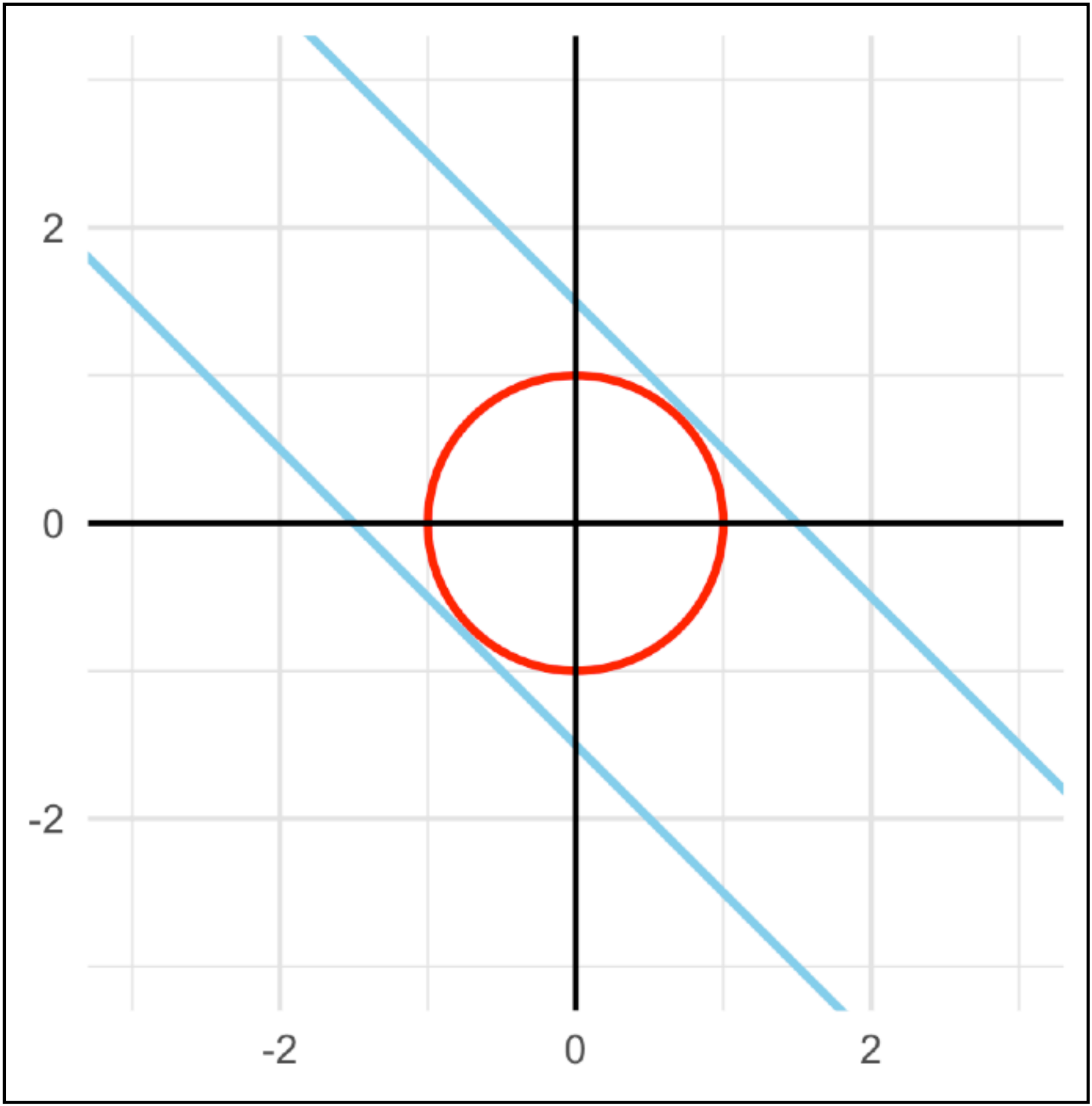
Optimize subject to


$f(x, y)$

$$g(x, y) = k$$

$$g(x, y) = x^2 + y^2 = 1$$

$$f(x, y) = 2x + y$$


2
0
-2
-2
0
2

$$\max_{\beta_0,\beta_1,\ldots,\beta_p} M$$

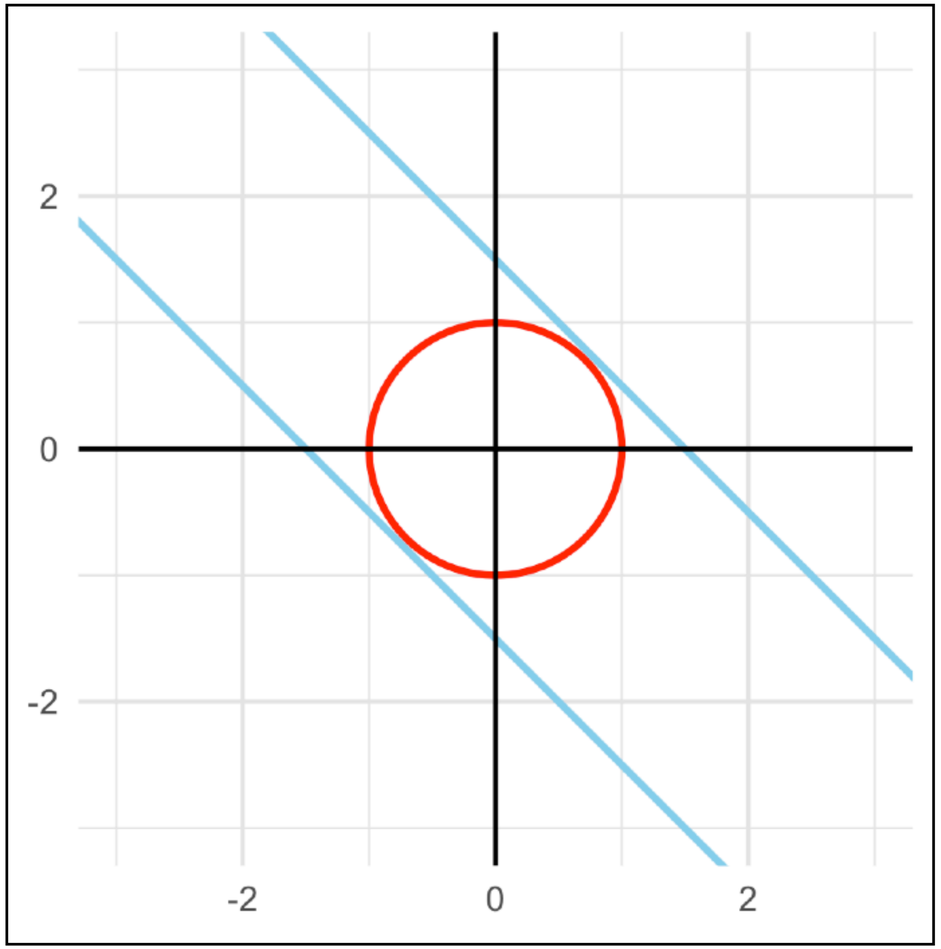
subject to:

$$\|\beta\| = 1$$

$$y_i(\beta_0 + \beta^T x_i) \geq M$$

What is a Constrained Optimization Problem?

Optimize $f(x, y)$ subject to $g(x, y) = k$

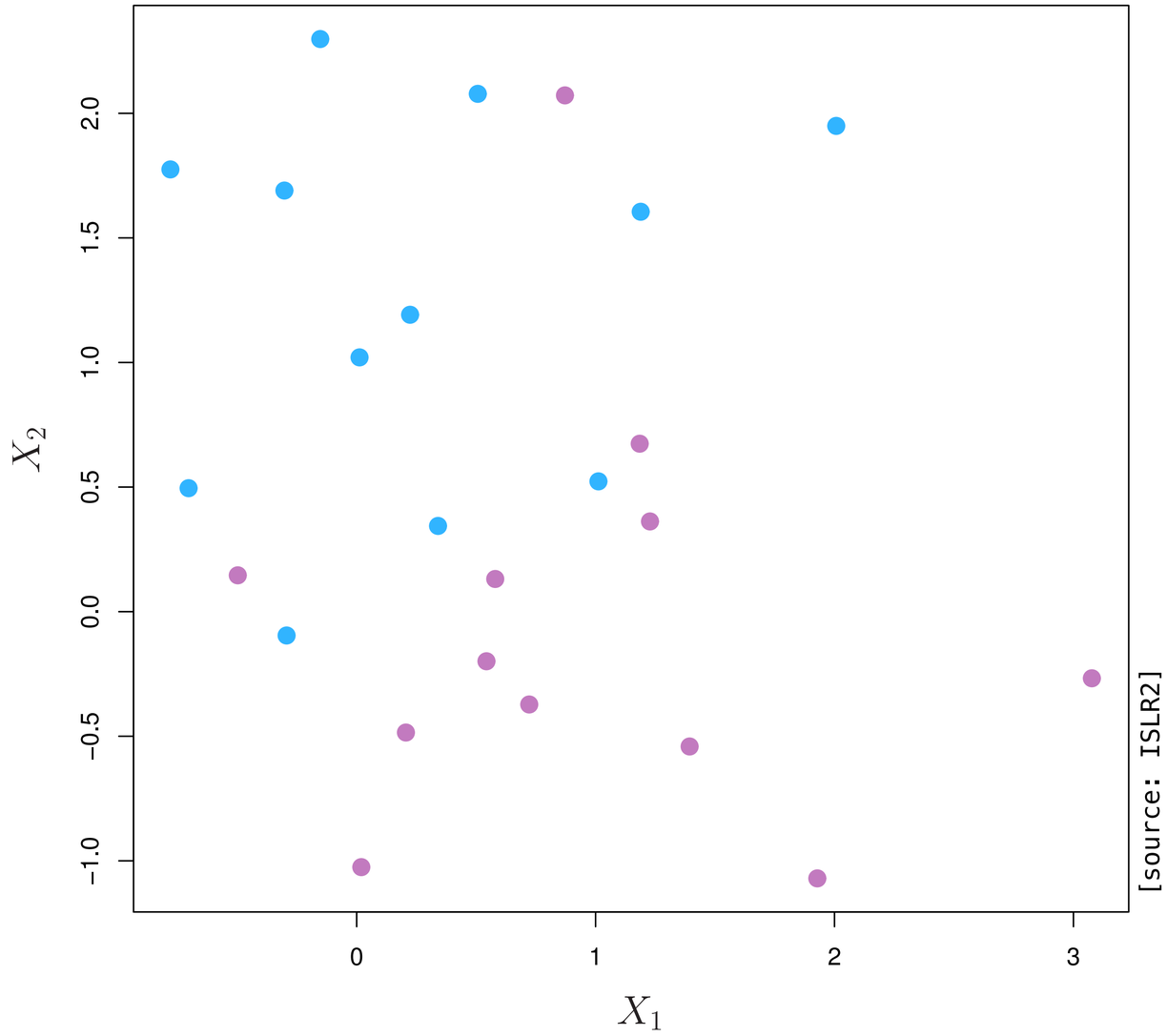


$$f(x, y) = 2x + y$$
$$g(x, y) = x^2 + y^2 = 1$$

$$\max_{\beta_0, \beta_1, \ldots, \beta_p} M$$

subject to:

$$\|\beta\| = 1$$
$$y_i(\beta_0 + \beta^T x_i) \geq M$$

The Non-Separable Case

the optimization problem for the maximal margin classifier often has no solution with $M > 0$