MINIMIZE x^2+y^2

s.t.

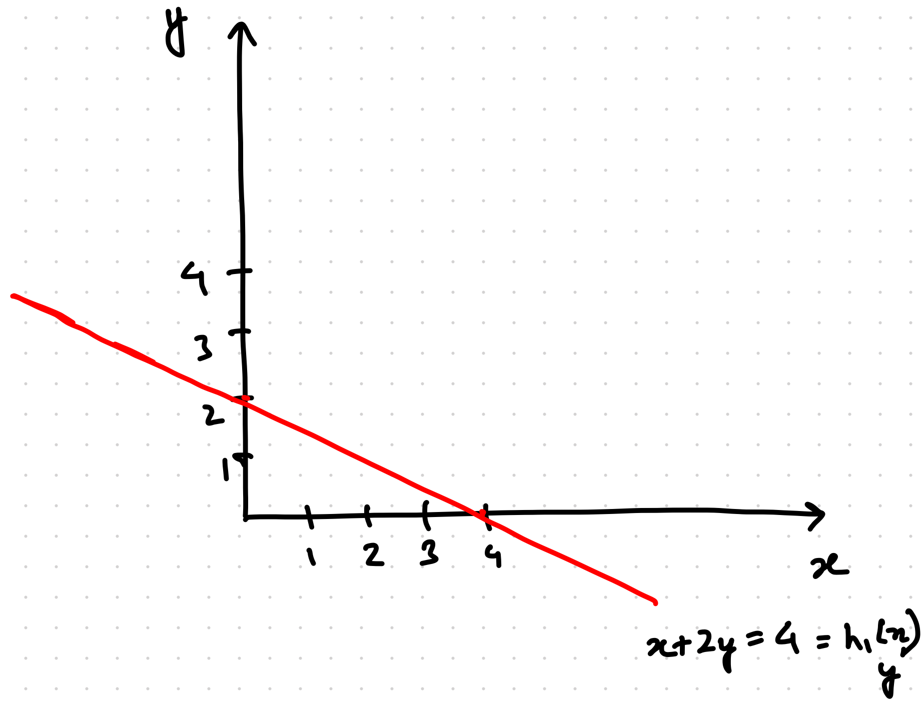
$x^2+y^2 \le 5$ or $g_1(x,y) = x^2+y^2-5 \le 0$ (μ_1)

$x+2y = 4$ or $h(x,y) = x+2y-4=0$

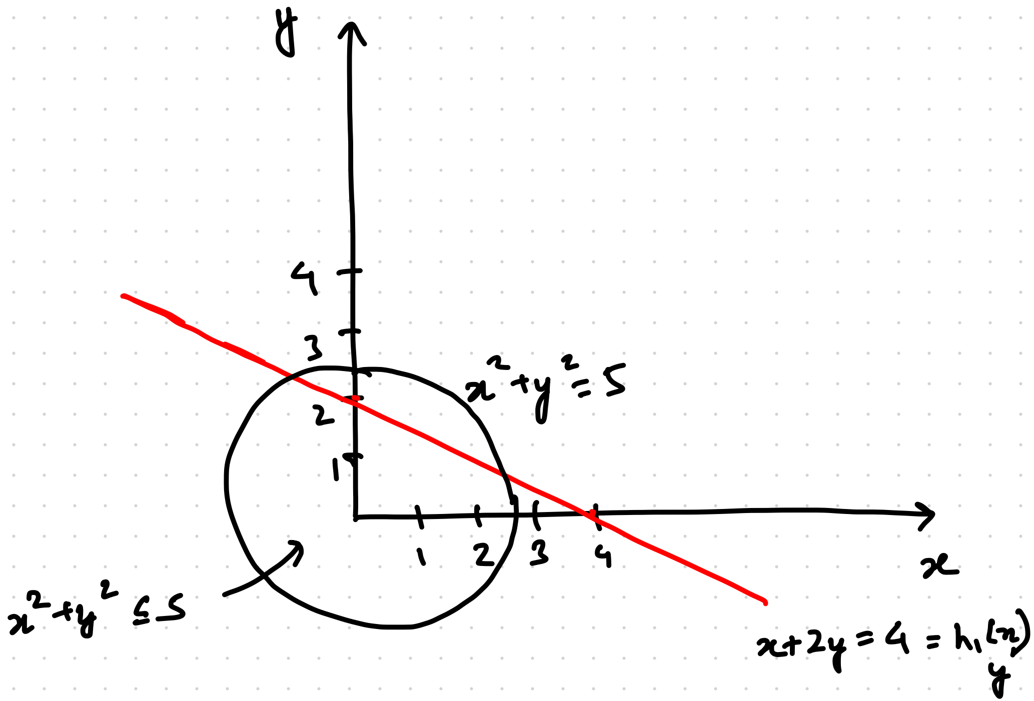
$x,y \geq 0$ or $g_2(x,y) = -x \le 0$ (μ_2)

$g_3(x,y) = -y \le 0$ (multiplier: μ_3)

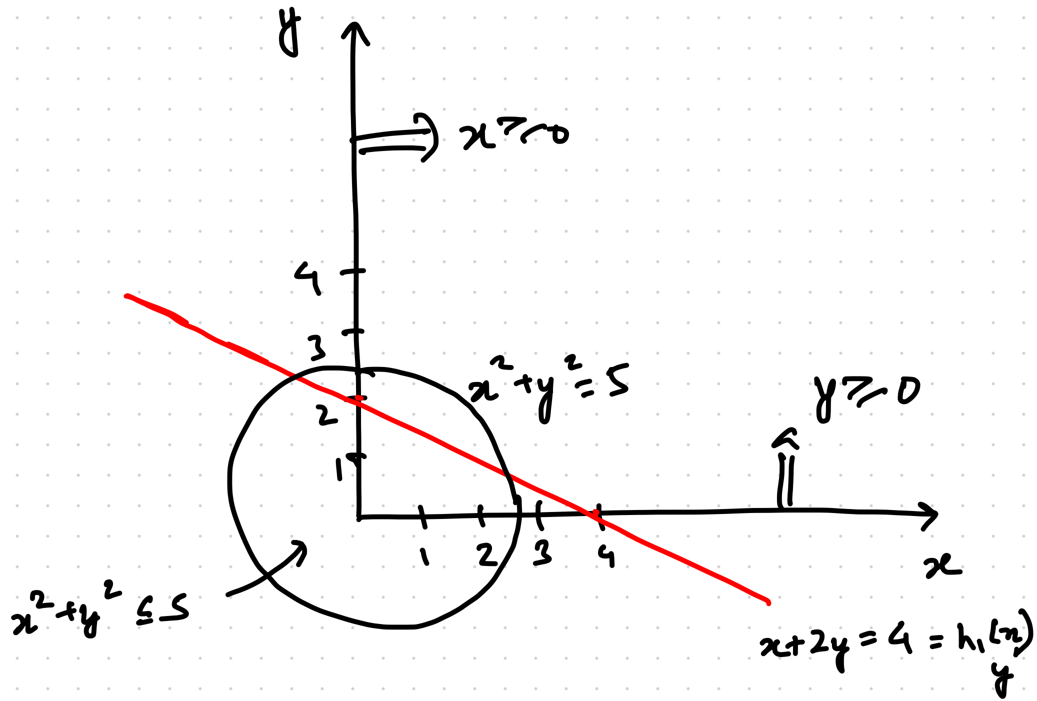
MINIMIZE $x^2 + y^2$



MINIMIZE $x^2 + y^2$

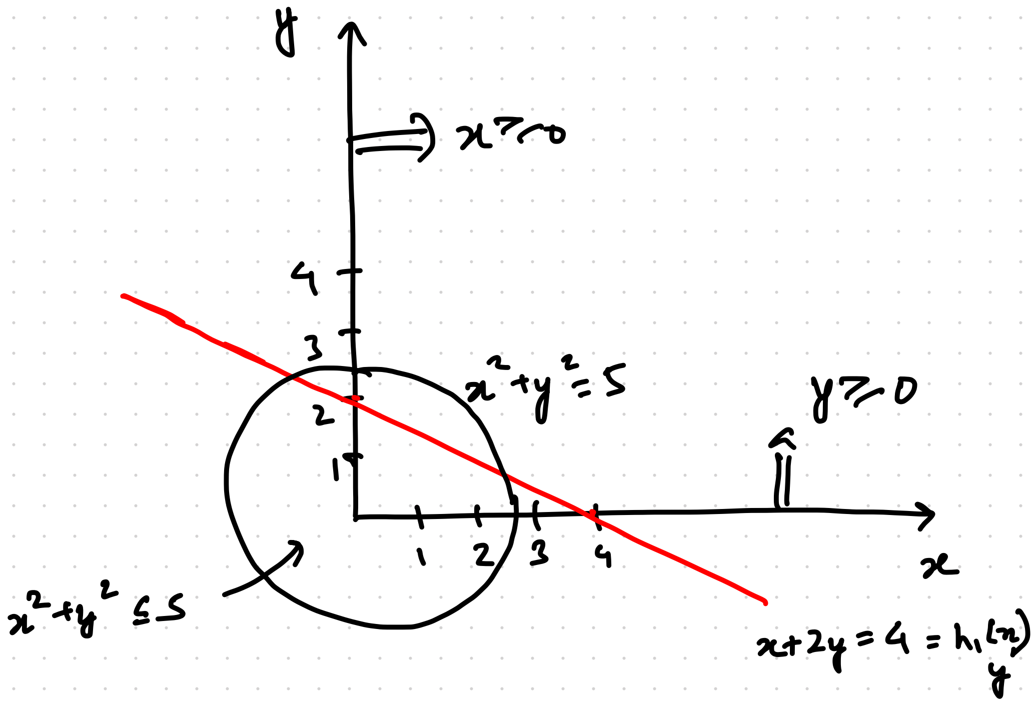


MINIMIZE x^2+y^2

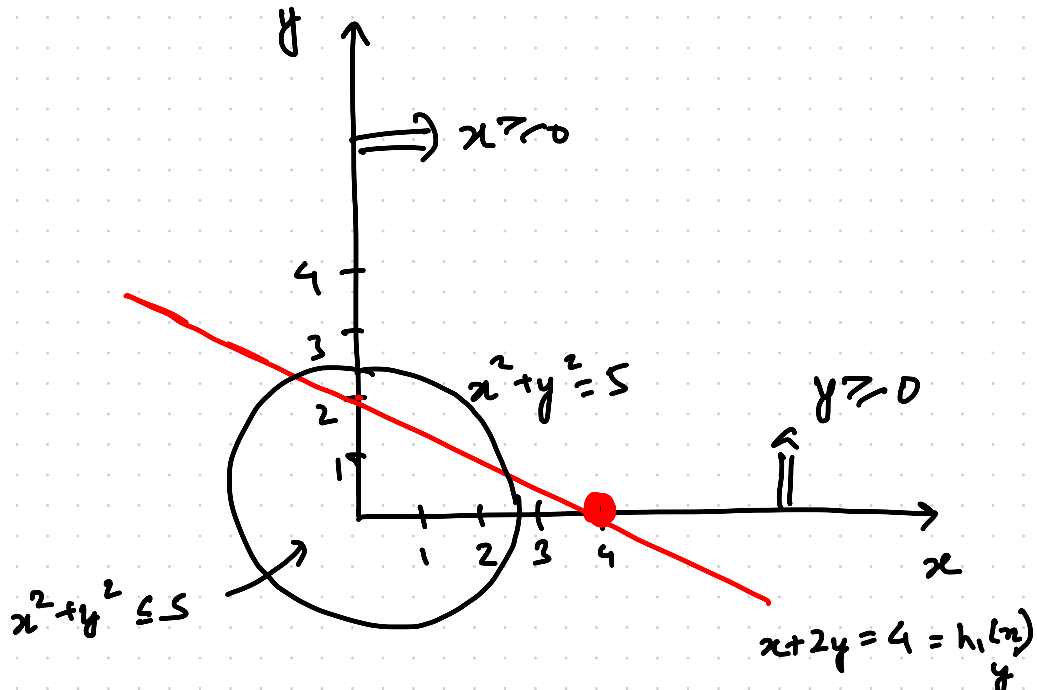


MINIMIZE x^2+y^2

$\mu_3 = 0$ ¦ $\alpha > 0$



MINIMIZE $x^2 + y^2$



$\mu_3 = 0$ or > 0

$\mu_3 > 0$

$\Rightarrow y = 0$

$\Rightarrow x = 4$

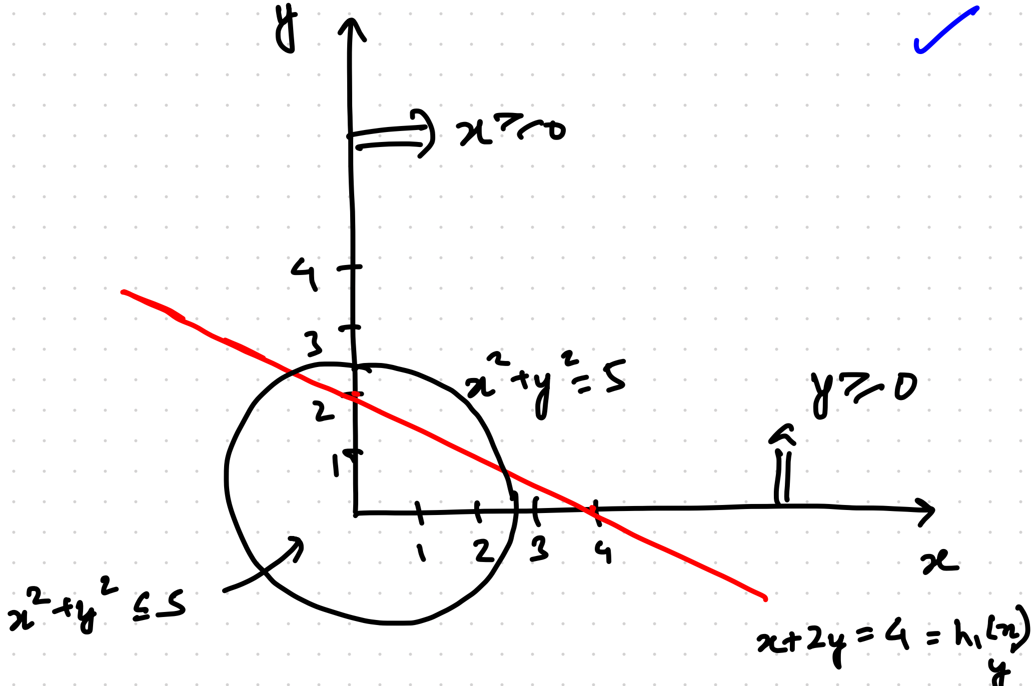
But doesn't satisfy

$x^2 + y^2 \leq 5$

$\therefore \mu_3 \not> 0$

MINIMIZE $x^2 + y^2$

$\mu_3 = 0$



$\mu_3 = 0$ ✓

or > 0

$\mu_3 > 0$

$\Rightarrow y = 0$

$\Rightarrow x = 4$

But doesn't satisfy

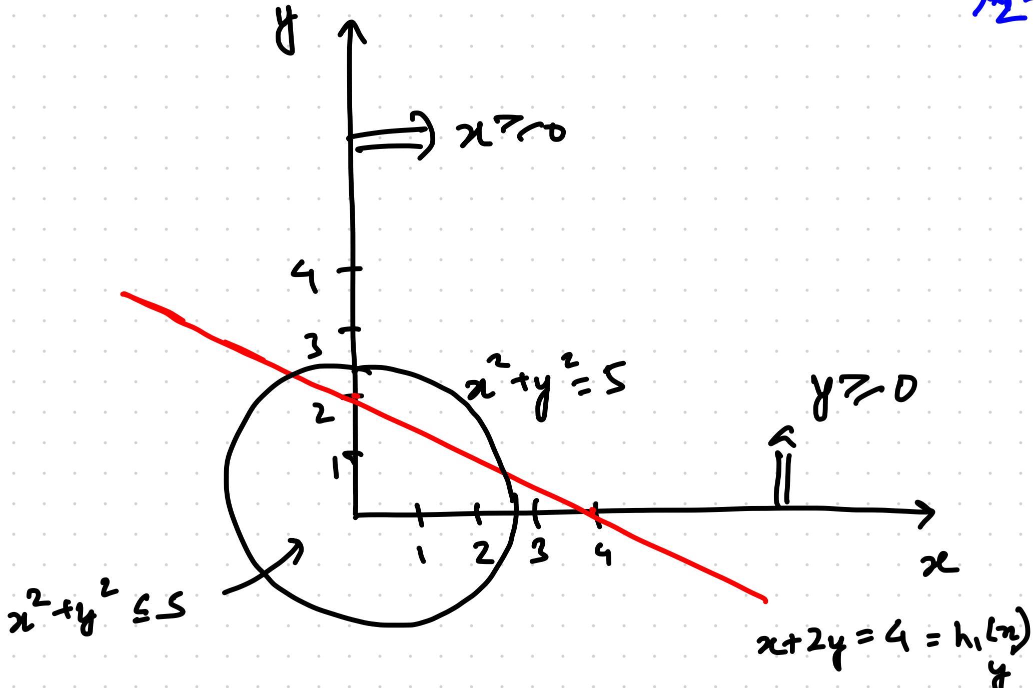
$x^2+y^2 \leq 5$

$\therefore \mu_3 \not> 0$

MINIMIZE $x^2 + y^2$

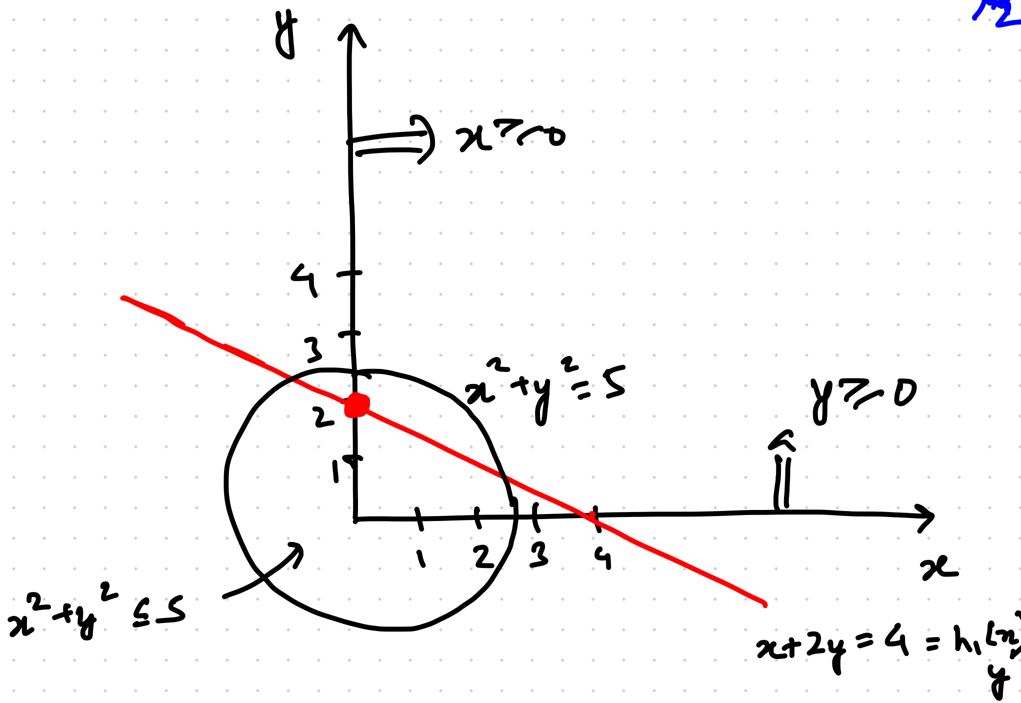
$\mu_3 = 0$

$\mu_2 = 0$ | $\mu_2 > 0$



MINIMIZE x^2+y^2

$\mu_3 = 0$



$\mu_2 = 0$

$\mu_2 > 0$

$\Rightarrow x = 0$

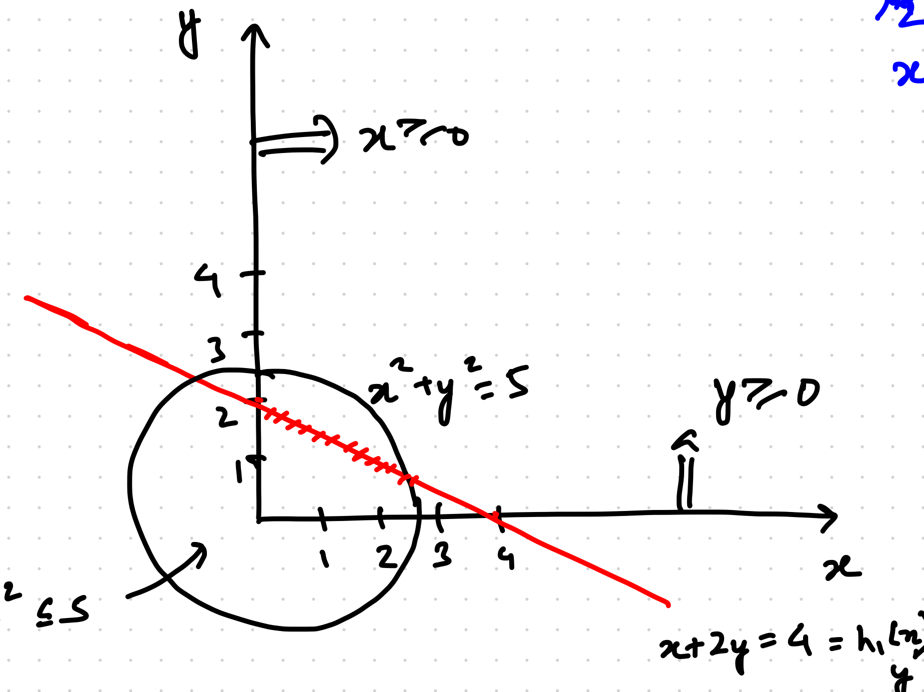
$\Rightarrow y = 2$

Feasible soln.

$x^2+y^2=4$

MINIMIZE $x^2 + y^2$

$\mu_3 = 0$



$\mu_2 = 0$

$x \geq 0$

$\mu_2 > 0$

$\Rightarrow x = 0$

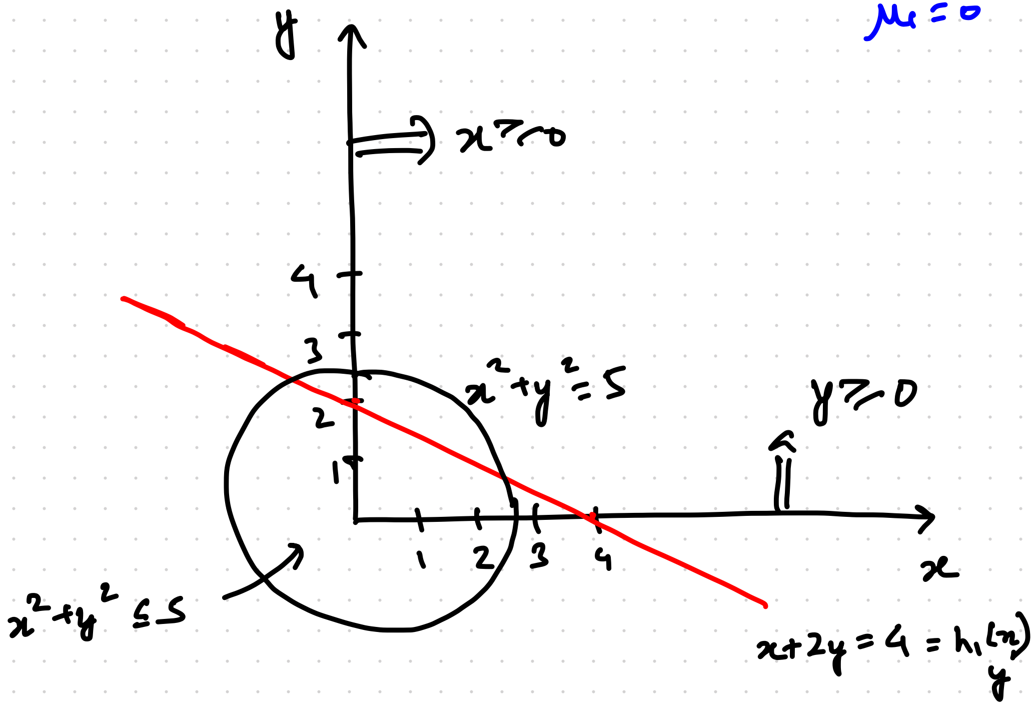
$\Rightarrow y = 2$

Feasible soln.

$x^2+y^2=4$

MINIMIZE x^2+y^2

$\mu_3 = 0$



$\mu_1 = 0$

$\mu_1 > 0$

$\Rightarrow x^2+y^2 = 5$

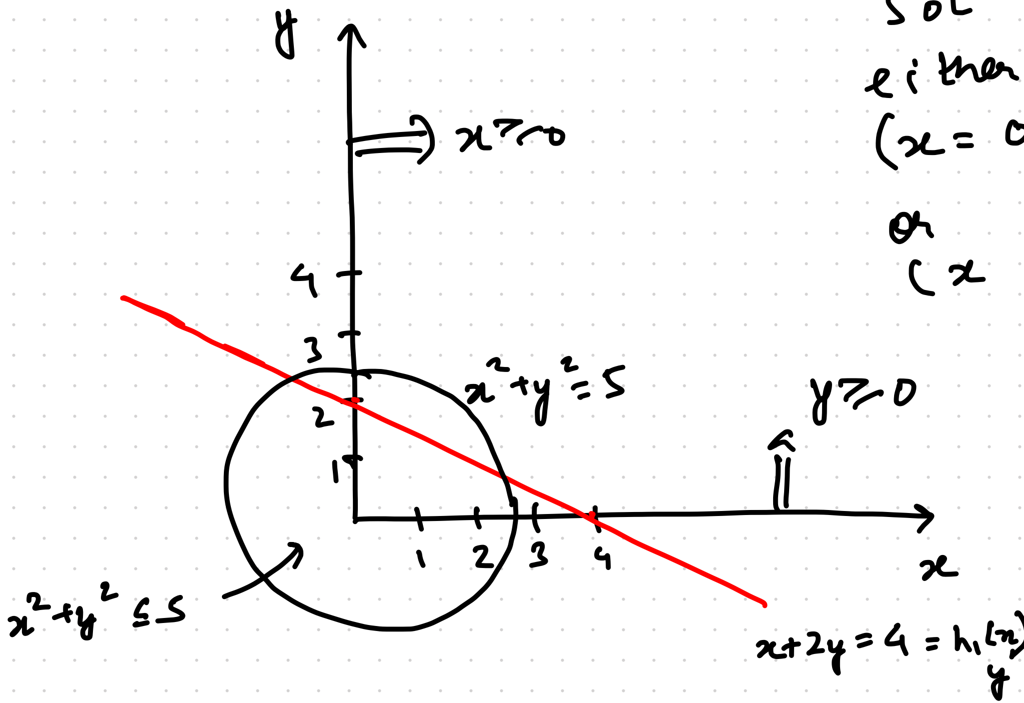
But we have seen better sol^n

$\therefore \mu_1 = 0$

MINIMIZE $x^2 + y^2$

$\mu_3 = 0$

$\mu_1 = 0$



Sol^n is either $(x = 0, y = 2)$

or

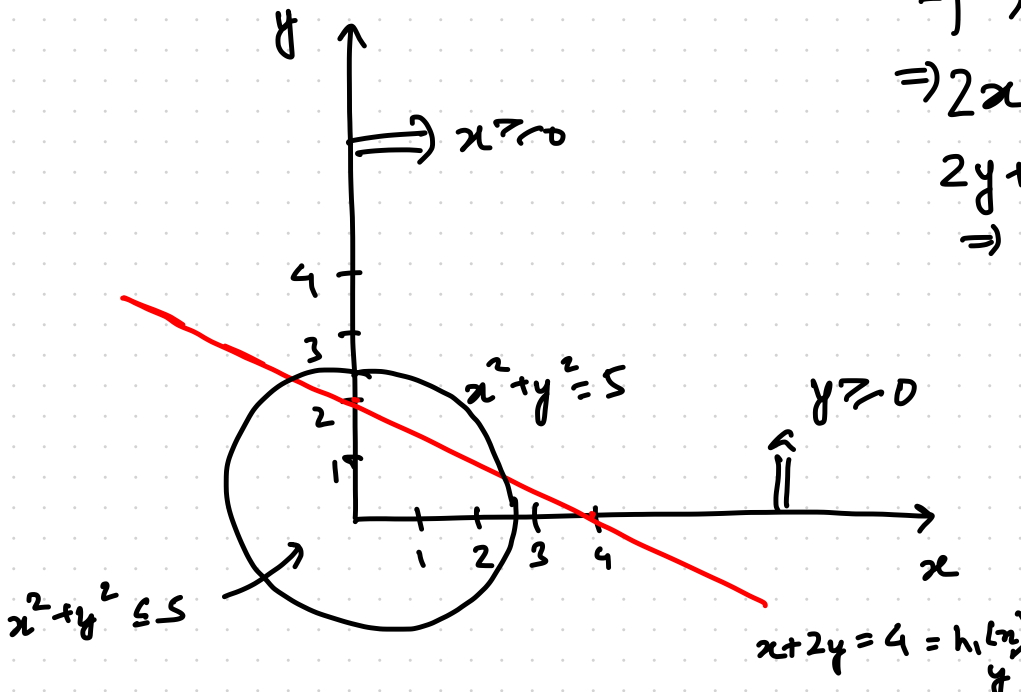
(x on $x + 2y = 4$ line till it intersects circle)

MINIMIZE $x^2 + y^2$

$\mu_3 = 0$

$\mu_1 = 0$

$\mu_2 = 0$



If $\mu_2 = 0$

$\Rightarrow 2x + \lambda = 0$

$2y + 2\lambda = 0$

$\Rightarrow x = -\frac{\lambda}{2}$

$y = -\lambda$

$\therefore y = 2x$

or

$x + 2y = 4$

$\Rightarrow 5x = 4$

or $x = .8$

$y = 1.6$