transmitter (x_t) $x_t = (-2, -4)$

receiver (x_r)

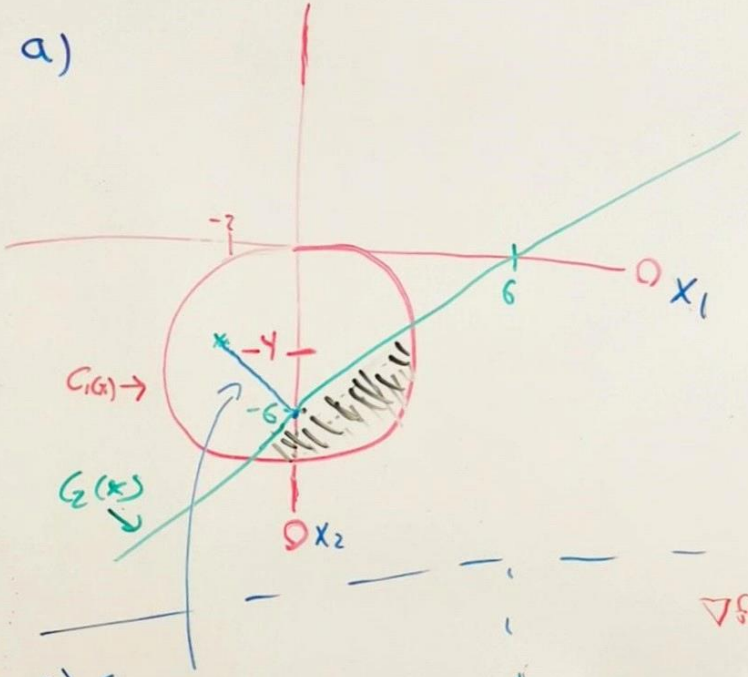
Power $= P(x) \propto \frac{1}{d^2}$ (max. this) d = distance

Constraints:

$$c_1(x) = -x_1^2 - (x_2 + 4)^2 + 16 \geq 0$$

$$c_2(x) = x_1 - x_2 - 6 \geq 0$$

a)



c) Solve graphically

b) Cost function

$$f(x) = d^2 = |x_r - x_t|^2 = (x_{r,1} - (-2))^2 + (x_{r,2} - (-4))^2$$

$$\min |x_r - x_t|^2$$

s.t.

$$x_r \in \{x_r \in \mathbb{R}^2 \mid c_1(x_r), c_2(x_r)\}$$

d) $\nabla f(x_r) = \begin{pmatrix} 2(x_{r,1} + 2) \\ 2(x_{r,2} + 4) \end{pmatrix}$

$\nabla f((12, -6)) = \begin{pmatrix} 4 \\ -4 \end{pmatrix}$

$\nabla f(x_r)^T d = \begin{pmatrix} 4 & -4 \end{pmatrix} \begin{pmatrix} d_1 \\ d_2 \end{pmatrix} = 4d_1 - 4d_2 \geq 0$

since $d_2 \leq d_1$