

* compressed sensing example

①

- Assuming $\Psi = I$

min $\|x\|_1$ subject to $y = \Psi x$

* $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$

$$x_2 = \frac{1}{3}x_1 + 2$$

minimize $\|x\|_1$

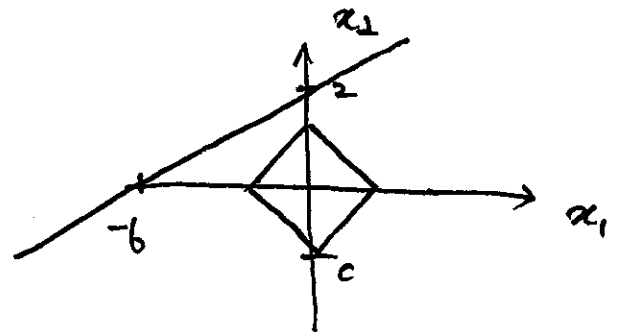
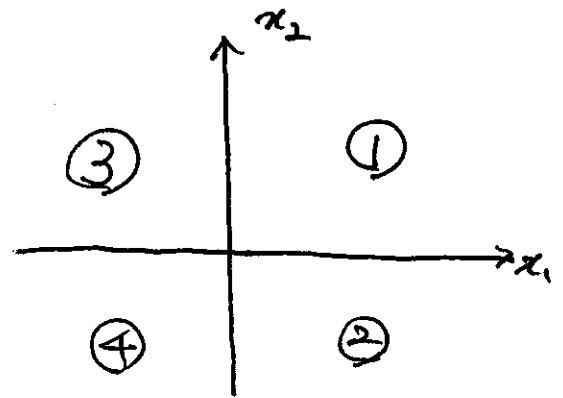
- $\|x\|_1 = |x_1| + |x_2| = c$

① $x_1 > 0, x_2 > 0$

② $x_1 > 0, x_2 < 0$

③ $x_1 < 0, x_2 > 0$

④ $x_1 < 0, x_2 < 0$

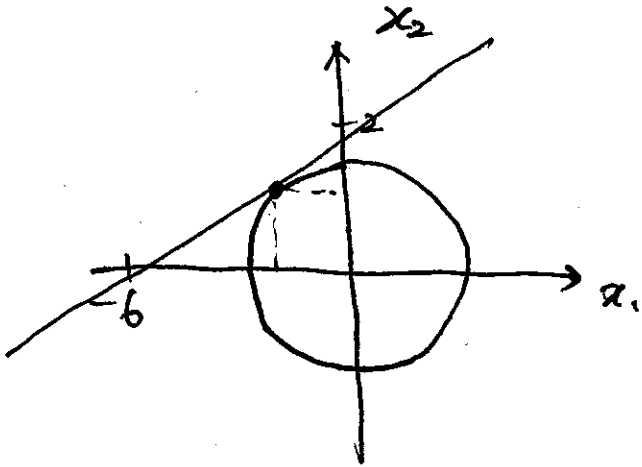


- $x_2 = \frac{1}{3}x_1 + 2$

\Rightarrow solution $\Rightarrow x_1 = 0, x_2 = 2 \quad \begin{bmatrix} 0 \\ 2 \end{bmatrix}$

- How about l_2 -norm?

$$- \|x\|_2 = \sqrt{|x_1|^2 + |x_2|^2} = C$$



⇒ Solution is NOT sparse!