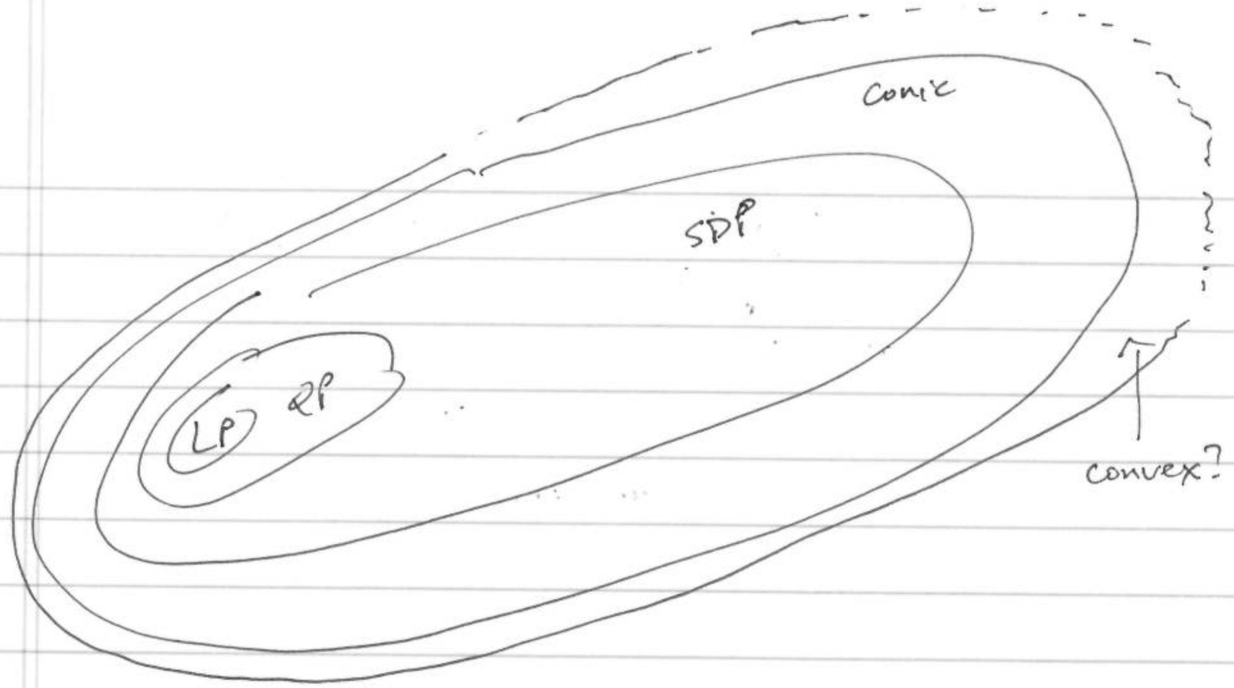
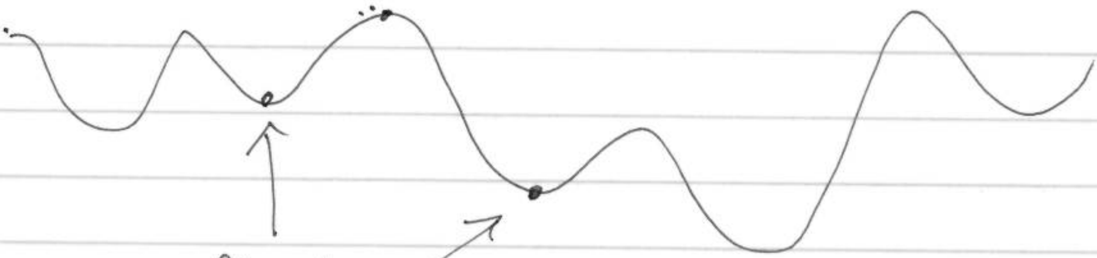
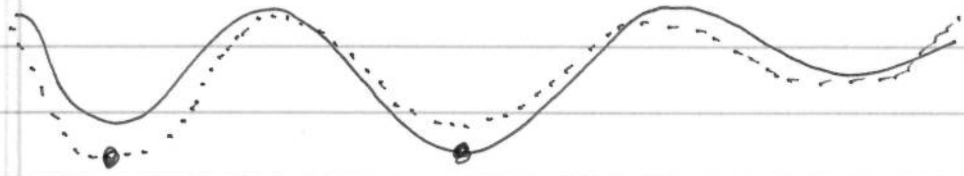



⇓ Zoom out

different
initializations
lead to very diff
solutions



$$\begin{aligned} \min_{x,y} \quad & c^T x + f(y) \\ & Ax = b \\ & x \geq 0 \\ & f(y) = 0 \end{aligned}$$

nonconvex

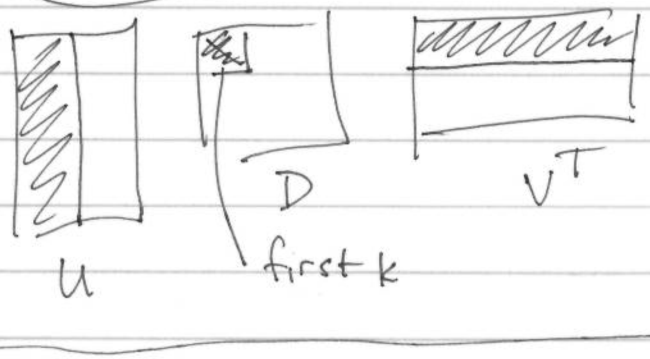
$\|x\|_2 = 1$ as constraint

$\Rightarrow$ nonconvex problem

relax to $\|x\|_2 \leq 1$

$\Rightarrow$ convex problem

Not generically the same, but are the same if ineq. is tight at solution of latter problem



$$\min_{Z} \| S - ZS \|_F^2 \qquad Z \text{ is a projection}, \ \operatorname{rank}(Z) = k$$

---

$$\operatorname{rank}\left( \frac{1}{2}\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} + \frac{1}{2}\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \right) = 2$$

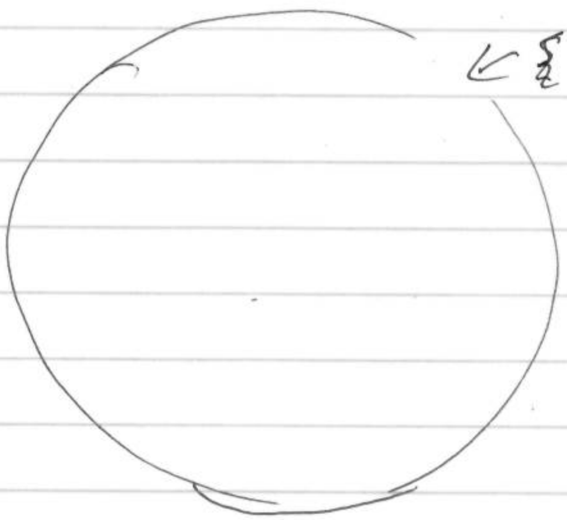
---

$(x_i, y_i)$

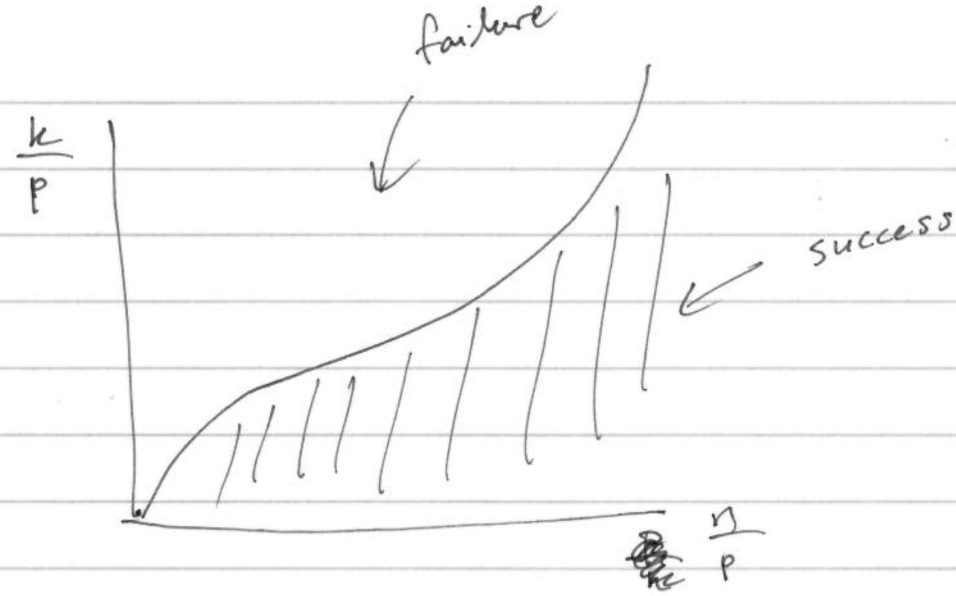
$k = 3$

$$\min_{f} \sum (y_i - f(x_i))^2 + \lambda \int_a^b (f''(x))^2 \, dx$$

cubic smoothing splines



$\{ X \in \mathbb{R}^{n \times p} : \|X_i\|_2 = 1, \ i = 1 \ldots p \}$


failure
success
$\frac{k}{p}$
$\frac{n}{p}$