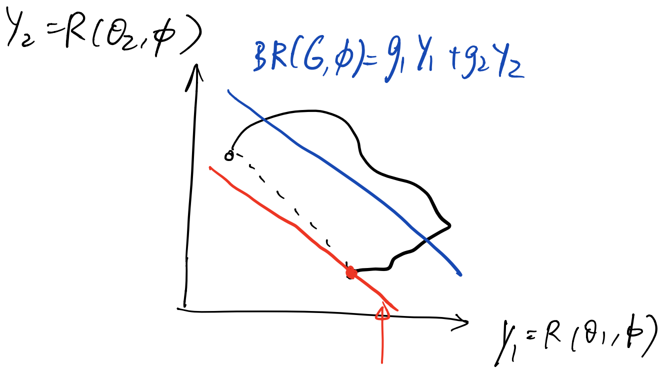
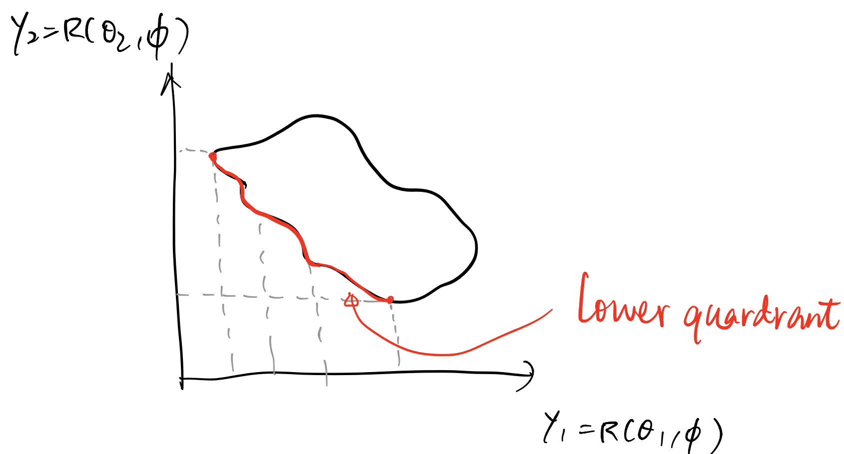
- Baye's Risk

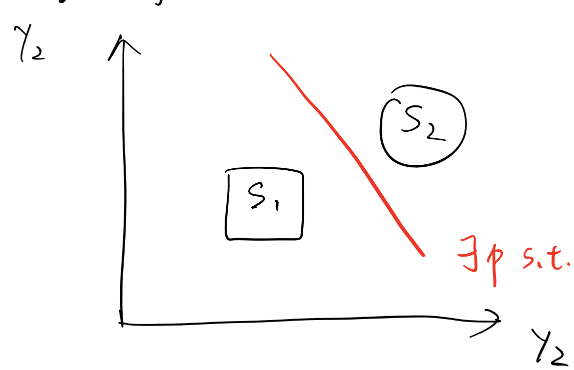


ϕ Bayes Risk function w.r.t. G

- Lower quadrant

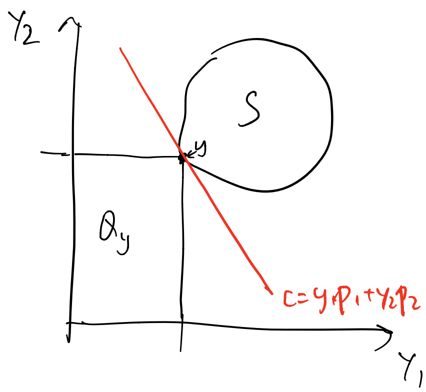


- Separating Hyperplane



$\exists p$ s.t. $\sum_{i=1}^{p} p_i x_i \le \sum_{i=1}^{p} p_i y_i$ where $x \in S_1$, $y \in S_2$

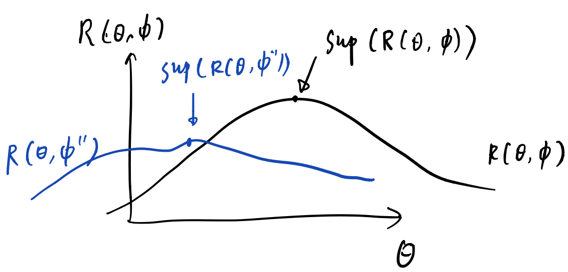
– Construct Bayes's Rule from Admissible Rule



- $Q_y \setminus \{y\}$ is convex
- ϕ is admissible $\Rightarrow$ $S \cap Q_y = \{y\}$
- $Q_y \setminus \{y\}$ and S are disjoint

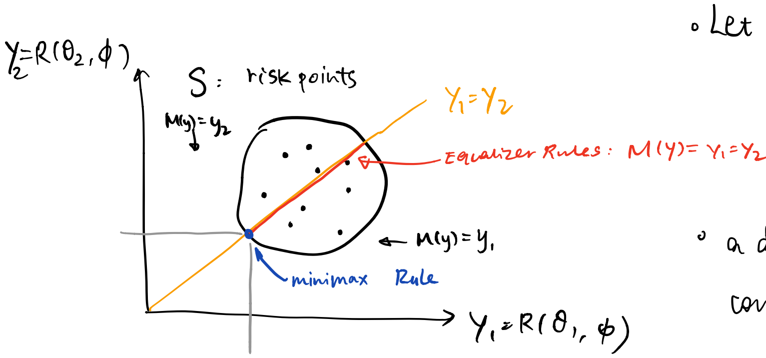
$\Rightarrow$ By Seperating Hyperplane Theorem, $\exists\, c = y_1p_1 + y_2p_2$ that is Bayes's Rule.

– Minimax decision Rule.



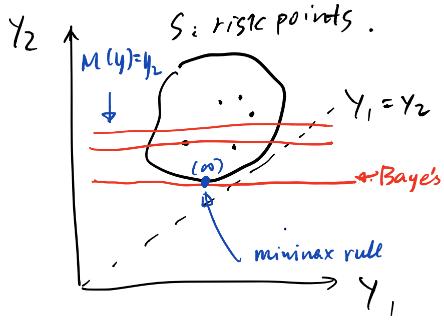
- $\sup\limits_{\theta\in\Theta} R(\theta,\phi) = \inf\limits_{\phi\in D^*} \sup\limits_{\theta\in\Theta} R(\theta,\phi')$

– Equalizer Rule



- Let $M(y) = \max\{Y_1, Y_2\}$
- a decision Rule $\phi \in D^*$ has a constant risk function

- Theorem 85:



- Let $G = (0, 1)$
- $BR(G, \phi) = R(\theta_2, \phi) = Y_2$

Baye's Rule: $BR(G, (\infty)) = Y_2 \text{ of } (\infty) \geq Y_1 \text{ of } (\infty)$

$BR(G, (\infty)) = Y_2 \text{ of } (\infty)$

$\geq \max_{i=1,2} R(\phi_i, \infty)$

$= \max \{Y_1, Y_2 \text{ of } (\infty)\}$