ex1 (a)

$$L = \max_{X_1} R_f + X_1^T(\mu - R_f) - \frac{\gamma}{2} X_1^T \Sigma X_1 - |X_1 - X_0|^T b$$

$$\frac{\partial L}{\partial X_1} = \mu - R_f - \gamma \Sigma X_1 - b\,\text{sign}|X_1 - X_0| \quad \therefore$$

$$\therefore X_1^* = (\gamma \Sigma)^{-1}(\mu - R_f - b\,\text{sign}|X_1 - X_0|)$$

$$\therefore X_1^* = \begin{cases} (\gamma \Sigma)^{-1}(\mu - R_f - b) & X_1 > X_0 \text{ (buy risky asset)} \\ (\gamma \Sigma)^{-1}(\mu - R_f + b) & X_1 < X_0 \text{ (sell risky asset)} \end{cases}$$

$$\therefore X_L = (\gamma \Sigma)^{-1}(\mu - R_f - b)$$

$$X_H = (\gamma \Sigma)^{-1}(\mu - R_f + b)$$

$$X_1^* = \begin{cases} (\gamma \Sigma)^{-1}(\mu - R_f - b) & X_0 < X_L \\ (\gamma \Sigma)^{-1}(\mu - R_f + b) & X_0 > X_H \\ X_0 & \text{o/w} \end{cases}$$

$\therefore$ no trade region: $[(\gamma \Sigma)^{-1}(\mu - R_f - b), (\gamma \Sigma)^{-1}(\mu - R_f + b)]$.