2.27.

$\Sigma_1 = \Sigma_2 = \Sigma$.

boundary: $w^t(x - x_0) = 0$.

$$w = \Sigma^{-1}(\mu_1 - \mu_2).$$

$$x_0 = \frac{1}{2}(\mu_1 + \mu_2) - \frac{\ln[P(\omega_1)/P(\omega_2)]}{(\mu_1-\mu_2)^t \Sigma^{-1}(\mu_1-\mu_2)}(\mu_1 - \mu_2).$$

Bayes decision boundary not pass between the two means.

$$\left\{\begin{array}{l} w^t(\mu_1 - x_0) > 0 \text{ and } w^t(\mu_2 - x_0) > 0 \\ \text{or } w^t(\mu_1 - x_0) < 0 \text{ and } w^t(\mu_2 - x_0) < 0 \end{array}\right.$$

$$w^t(\mu_1 - x_0) = (\mu_1-\mu_2)^t \Sigma^{-1} \tfrac{1}{2}(\mu_1 - \mu_2) - \ln[P(\omega_1)/P(\omega_2)]$$
$$= \frac{1}{2}(\mu_1-\mu_2)^t \Sigma^{-1}(\mu_1 - \mu_2) - \ln[P(\omega_1)/P(\omega_2)].$$

$$w^t(\mu_2 - x_0) = \frac{1}{2}(\mu_1-\mu_2)^t \Sigma^{-1}(\mu_2 - \mu_1) - \ln[P(\omega_1)/P(\omega_2)].$$

$$\left\{\begin{array}{l} \frac{1}{2}(\mu_1-\mu_2)^t \Sigma^{-1}(\mu_1-\mu_2) > \ln[P(\omega_1)/P(\omega_2)] \\ -\frac{1}{2}(\mu_1-\mu_2)^t \Sigma^{-1}(\mu_1-\mu_2) > \ln[P(\omega_1)/P(\omega_2)] \end{array}\right.$$

$$\text{or } \left\{\begin{array}{l} \frac{1}{2}(\mu_1-\mu_2)^t \Sigma^{-1}(\mu_1-\mu_2) < \ln[P(\omega_1)/P(\omega_2)] \\ -\frac{1}{2}(\mu_1-\mu_2)^t \Sigma^{-1}(\mu_1-\mu_2) < \ln[P(\omega_1)/P(\omega_2)]. \end{array}\right.$$