

Name:

Student ID#:

Statistical Pattern Recognition (CE-725)
Department of Computer Engineering
Quiz #5 (Classification – Probabilistic Methods) - Spring 2012

1. (50 points) Consider a binary classification problem with likelihoods $P(x|C_1) \sim N(0, \sqrt{3})$ and $P(x|C_2) \sim N(2, 1)$. Assume $P(C_1) = P(C_2)$, $\lambda_{11} = 0$, $\lambda_{12} = 1$ and $\lambda_{21} = \sqrt{3}$. Find the decision boundary which minimizes $P(\text{error})$.

Hint: $\sqrt{3} \approx 1.73$

2. (50 points) Consider a binary classification problem with likelihoods $P(x|C_1) = x + \frac{1}{2}$,

$P(x|C_2) = \frac{3x^2}{4} + \frac{3}{4}$ both for $x \in [0, 1]$. Assume $P(C_2) = 0.25$, and the cost matrix $\lambda = \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$.

Find the classifier which minimizes the conditional risk.