

## Assignment 1: Get Ready for LaTeX

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## Problems

### Problem: Description Goes Here

Consider the following decision rule for a two-category one-dimensional problem: Decide  $\omega_1$  if  $x > \theta$ ; otherwise decide  $\omega_2$ .

- (a) Show the probability of error for this rule is given by

$$P(\text{error}) = P(\omega_1) \int_{-\infty}^{\theta} p(x|\omega_1) dx + P(\omega_2) \int_{\theta}^{\infty} p(x|\omega_2) dx.$$

- (b) By differentiating, show that a necessary condition to minimize  $P(\text{error})$  is that satisfy

$$p(\theta|\omega_1)P(\omega_1) = p(\theta|\omega_2)P(\omega_2).$$

- (c) Does this equation define  $\theta$  uniquely?

- (d) Give an example where a value of  $\theta$  satisfying the equation actually maximizes the probability of error.

*Answer:* 答案写在此处.

### Problem 1: 标题

在一个 10 类的模式识别问题中, 有 3 类单独满足多类情况 1, 其余的类别满足多类情况 2. 问该模式识别问题所需判别函数的最少数目是多少?

*Answer:* 答案写在此处.

## Computer Exercises

此处可以插入一些说明.

Several of the computer exercises will rely on the following data.

### Computer Exercise 1

Illustrate the fact that the average of a large number of independent random variables will approximate a Gaussian by the following:

- (a) Write a program to generate  $n$  random integers from a uniform distribution  $U(x_l, x_u)$ .

- (b) Now write a routine to choose  $x_l$  and  $x_u$  randomly, in the range  $-100 \leq x_l < x_u \leq 100$ , and  $n$  (the number of samples) randomly in the range  $0 < n \leq 1000$ .
- (c) Generate and plot a histogram of the accumulation of  $10^4$  points sampled as just described.
- (d) Calculate the mean and standard deviation of your histogram, and plot it.
- (e) Repeat the above for  $10^5$  and for  $10^6$ . Discuss your results.

*Answer:* 答案写在此处.