

Stat W 4201, Spring 2016
Assignment #9: Due April 13

1. Chapter 20, problem 12
2. Chapter 21, problem 16
3. Suppose that a population of individuals is partitioned into sub-populations or groups, G_1 and G_2 . It may be helpful to think of G_1 in an epidemiological context as the carriers of a particular virus, comprising $100\pi_1\%$ of the population, and G_2 as the non-carriers. Measurements Z made on individuals have the following distributions in the two groups:

$$\begin{aligned} G_1 &: Z \sim N(\mu_1, \Sigma) \\ G_2 &: Z \sim N(\mu_2, \Sigma). \end{aligned}$$

Let z be an observation made on an individual drawn at random from the combined population. The prior odds that the individual belongs to G_1 are $\pi_1/(1 - \pi_1)$. Show that the posterior odds given z are

$$\frac{\pi_1}{1 - \pi_1} \exp(\alpha + \beta^T z)$$

and give the form of α and β . For more discussion on logistic discrimination and linear discriminant analysis, see Efron (1975). The efficiency of logistic regression compared to normal discriminant analysis (1975). *Journal of the American Statistical Association* **70**, 892-898.