1. Do problem 4, p.469, but take $f_0$ to be the pdf of a beta (4,1).

2. Do problem 7, p. 470, but in part (b) take $n = 5$. To get started, first write down the likelihood ratio $f_1/f_0$ where $f_i$ is the likelihood function for $N(\mu, \sigma_i^2)$. Then plug in the appropriate values for $\sigma_i$, and set $Y = \sum_{i=1}^{n} (X_i - \mu)^3$.

3. Problems 15 and 16, p. 478. To show that UMP's exist, verify that the appropriate likelihood function has a monotone likelihood ratio in a statistic $T$ which you should identify.


5. Consider the situation of Problem 2, p.525, but take $f_0(x) = 2x$ for $0 < x < 1$, $f_0(x) = 0$ for other $x$, and suppose that the loss from deciding that $f_1$ is correct when in fact $f_0$ is correct is 6 units.

   (a) Write down the associated loss function in terms of a cost matrix.

   (b) Describe the test which minimizes the expected loss. "Describe" here means specify the values of $X$ for which we would decide that $f_0$ is correct.

   (c) Calculate the value of the minimal expected loss.

**Recommended Problems:**

§8.2: 1-10.

§8.3: 8, 9, 13, 14.
§8.4: 1, 3, 5, 10.

§8.8: 2, 3.

R1. Suppose that $X \sim N(\mu, \sigma^2)$ with $\sigma$ known and $\mu$ unknown. We saw that if $\mu_0 < \mu_1$, than among all tests $\delta$ of $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_1$ with $\alpha(\delta) \leq \alpha_0$, the test $\delta^*$ which minimizes $\beta(\delta)$ has the form: Reject $H_0$ if $\bar{X}_n > k$. In the problem below take $\alpha_0 = .10$.

(a) Find $k$ as a function of some or all of the variables $\mu_0, \mu_1, \sigma^2$, and $n$.

(b) If $\mu_0, \mu_1, \sigma^2$ are fixed, what happens to $k$ as $n \to \infty$?

(c) Suppose again that $\mu_0, \mu_1, \sigma^2$ are fixed. Verify that $\beta(\delta^*) \to 0$ as $n \to \infty$. Then find a formula the smallest $n$ for which $\beta(\delta^*) \leq .01$. 