

# ECE531 Homework Assignment Number 4

Due by 8:50pm on Thursday 19-Feb-2009

Make sure your reasoning and work are clear to receive full credit for each problem.

1. 4 points. Consider our standard coin flipping problem where you have an unknown coin, either fair (HT) or double headed (HH), and you observe the outcome of  $n$  flips of this coin. Assume a uniform cost assignment. For notational consistency, let the state and hypothesis  $x_0$  and  $\mathcal{H}_0$  be the case when the coin is HT and  $x_1$  and  $\mathcal{H}_1$  be the case when the coin is HH. When  $n = 2$ , find the Neyman-Pearson decision rule and corresponding power  $\beta$  for a false alarm probability  $0 < \alpha < 1$ . Repeat this for  $n = 3$  and comment on any changes.
2. 4 points. Poor textbook Chapter II, Problem 2 (c).
3. 4 points. Poor textbook Chapter II, Problem 6 (c).
4. 4 points. Poor textbook Chapter II, Problem 19.
5. 4 points. Poor textbook Chapter III, Problem 3. Also, try part (a) for the case when the noise is distributed as  $\mathcal{N}(0, \Sigma)$  where  $\Sigma \in \mathbb{R}^{n \times n}$  is the covariance matrix of the noise.