

ECE531 Homework Assignment Number 6

Due by 8:50pm on Wednesday 23-Mar-2011

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

1. 6 points. Suppose you have a scalar random parameter $\Theta \in \mathbb{R}$ with discrete prior distribution $\pi(\theta) = \frac{1}{2}(\delta(\theta - 1) + \delta(\theta + 1))$. You receive a single observation

$$Y = \Theta + W$$

where $W \sim \mathcal{N}(0, \sigma^2)$ and σ^2 is known.

- (a) 2 points. Find the Bayesian MMSE estimator for the parameter Θ .
 - (b) 2 points. Find the Bayesian MAP estimator for the parameter Θ .
 - (c) 1 point. Under what conditions are the MMSE and MAP estimates approximately equal?
 - (d) 1 points. Discuss how this problem relates to simple binary Bayesian hypothesis testing.
2. 4 points. Kay I, problem 10.3.
 3. 4 points. Kay I, problem 10.4.
 4. 4 points. Kay I, problem 10.12.
 5. 3 points. Kay I, problem 11.3. Also find the Bayesian MMAE estimator.
 6. 4 points. Kay I, problem 11.16.