

ESTIMATION AND DETECTION THEORY

HOMEWORK # 3:

Please work out the **seven** (7) problems stated below – HVP refers to the text: H. Vincent Poor, *An Introduction to Signal Detection and Estimation* (Second Edition), Springer Texts in Electrical Engineering Springer, New York (NY), 2010. With this in mind, Exercise **II.2** (HVP) refers to Exercise 2 for Chapter II of HVP. Exercises are located at the end of each chapter.

Show work and **explain** reasoning.

1. _____

Consider the simple binary hypothesis testing problem

$$\begin{aligned} H_1 : \quad Y &\sim N(a, 1) \\ H_0 : \quad Y &\sim N(0, 1) \end{aligned}$$

with $a \neq 0$, under the probability of error criterion.

1.a Compute the Bayes value $V : [0, 1] \rightarrow [0, 1] : p \rightarrow V(p)$.

1.b Can you show *directly* that $V : [0, 1] \rightarrow [0, 1]$ is a differentiable function? a concave function?

1.c Find p_m .

2. _____

Solve Part (b) of Exercise **II.2** (HVP).

3. _____

Solve Part (b) of Exercise **II.3** (HVP)

4. _____

Solve Part (b) of Exercise **II.4** (HVP)

5. _____

Solve Part (b) of Exercise **II.5** (HVP)

6. _____

Solve Part (b) of Exercise **II.7** (HVP)

7. _____

Solve Part (a) of Exercise **II.9** (HVP)