ESTIMATION AND DETECTION THEORY

HOMEWORK # 4:

Please work out the **ten** (10) 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

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

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

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

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

1.c Find p_{m}.

2. _____

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

3. _____

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

4. _____

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

5. _____

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

6. _____

Solve Part (b), Part (c) and Part (d) of Exercise **II.7** (HVP).

7. _____

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

8. _____

Solve Exercise **II.10** (HVP).

9. _____

Solve Exercise **II.11** (HVP).

10. _____

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