
Quiz 1
Time: 15 minutes

Problem 1

Consider a binary hypothesis testing problem specified by:

$$\begin{aligned} H = 0 & : \begin{cases} Y_1 = Z_1 \\ Y_2 = Z_1 Z_2 \end{cases} \\ H = 1 & : \begin{cases} Y_1 = -Z_1 \\ Y_2 = -Z_1 Z_2 \end{cases} \end{aligned}$$

where Z_1 , Z_2 and H are independent random variables.

(i) Is Y_1 a sufficient statistic? Recall that Y_1 is a sufficient statistic if a MAP decoder that observes (Y_1, Y_2) makes the same decision (up to ties) as a MAP decoder that observes Y_1 alone.

(Hint: If $Y = AZ$, (A scalar) then $f_Y(y) = \frac{1}{|A|} f_Z(\frac{y}{A})$).