Seminar 5 - Maximum Likelihood decision

DEDP

1. A signal can have four possible values: -6, -2, 2, 6. Each value lasts for 1 second. The signal is affected by white noise with normal distribution. The receiver takes 1 sample per second. Using ML criterion, decide what signal has been transmitted, if the received samples are:

$$4, 6.6, -5.2, 1.1, 0.3, -1.5, 7, -7, 4.4$$

Done partially. Useful, but not to consider for test:

2. A signal can have two possible values, $s_0 = -3$ or $s_1 = 3$. The signal is affected by gaussian noise with distribution $\mathcal{N}(0, 1)$. The receiver performs ML decision based on a single sample.
   a. What is the maximum variance σ^2 of the noise, such that the probability of wrongly detecting s_1 if the true signal is s_0 is at most 10^{-3}
   b. If the noise variance is $\sigma^2 = 0.5$, what is the minimum gap between the two signal levels $(s_1 - s_0)$ such that the probability of correct detection if the true signal is s_1 is at least 0.9999?