

# 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 exam**

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  $\sigma^2$  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?