

Problem Set 11
Signal Detection

Reading: Chapter 13.

What's not optional: Although this problem set is not to be turned in or graded, it is not optional, in the sense that the material on it is very relevant to what will be examined in a portion of the final. At least half of the final exam will be devoted to material covered after Quiz 2, and perhaps a quarter of the exam to hypothesis testing for random variables and for signals, i.e., the material on the previous problem set and this one. So do pay attention to these two problem sets! Some of the problems here, or closely related material, may be discussed in recitations and tutorials next week.

Final exam: The exam will be **comprehensive**, but as noted above, at least half will be devoted to material covered after Quiz 2. You can bring in **4 sheets of notes** (8 sides), but no other aids will be needed or allowed.

Problem 11.1

Problem 13.5 (in the hardcover “North American” edition of SSI, which is also Problem 13.2 in the softcover “Global Edition” of SSI)

Problem 11.2

Problem 13.10 (which is Problem 13.7 in the softcover “Global Edition” of SSI), but add the following part (f):

- (f) The ideal lowpass filter at the receiver is not the optimal filter for minimizing the probability of error. Specify in detail what the optimal frequency response would be (keeping in mind the given scaling of its impulse response).

Problem 11.3

Problem 13.3 (which is Problem 13.5 in the softcover “Global Edition” of SSI)

Problem 11.4

Problem 13.12 (which is Problem 13.8 in the softcover “Global Edition” of SSI).

Problem 11.5 (Optional)

If you are doing additional problems, please note that Problem 13.4 (in the hardcover edition) was incorrectly classified as Basic; it should have been an Advanced problem (it’s now Problem 13.12 in the softcover version)!

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