EC 415: Homework 5

Due by Friday 04/23/2021 6:00PM

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Exercise 8.1

The Matlab code in naivecode.m, which is on the website, implements the translation from binary to 4-PAM (and back again) suggested in (8.2). Examine the resiliency of this translation to noise by plotting the number of errors as a function of the noise variance v. What is the largest variance for which no errors occur? At what variance are the errors near 50%?

Solution

TODO

Exercise 8.2

A Gray code has the property that the binary representation for each symbol differs from its neighbors by exactly one bit. A Gray code for the translation of binary into 4-PAM is
$01 \rightarrow +3$
$11 \rightarrow +1$
$10 \rightarrow 1$
$00 \rightarrow 3$
Mimic the code in naivecode.m to implement this alternative and plot the number of errors as a function of the noise variance v. Compare your answer with Exercise 8.1. Which code is better?

Solution

TODO

Exercise 8.5

Can you think of a pulse shape that will have a narrower bandwidth than either of the above but that will still be time limited by T ? Implement it by changing the definition of ps, and check to see whether you are correct.

Solution

TODO

Exercise 8.8

Rerun correx.m with different amounts of noise. Try sd=0, 0.1, 0.3, 0.5, 1, 2. How large can the noise be made if the correlation is still to find the true location of the header?

Solution

TODO

Extra Question

TODO

Solution

TODO