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ECE251 Assignment 2 explanation

1. I chose a sampling frequency of 12kHz because it was enough to contain the non-aliased passband signal with a bit of extra on either side for visual framing of the PSDs.
2. I chose to band-limit the signal to 1kHz, because that was enough to contain only the main lobe. Turns out that if you only filter for the main lobe, then in order to count the number of bits in a sequence of identical bits in the time-domain demodulated signal, you just need to count the number of oscillatory peaks in the block. This is convenient for visually telling how many identical bits are next to each other. To ensure the PSD was averaged over multiple data blocks, I have a variable to set the number of symbols per PSD block. Adjusting this variable has the effect of visually varying the noise present in the PSD due to the random bits.
3. –
4. The main difference I’m noticing between the transmitted signals and the original signal is that the ‘standard’ transmitted signal z1(t) is delayed by an amount of time equal to 1000/(2\*fs) seconds and the quadrature transmitted signal z2(t) is delayed by 2\*1000/(2\*fs) seconds. I’m not sure the reason for this right off the bat. Other than this delay, the two received signals have no noticeable difference between each other. Both received signals have an oscillation present that the original signal doesn’t because of the band-limiting performed prior to modulation.