EE 308: Communication Systems

Homework 4

1. We have covered Phase Locked Loops. Some of the discussion is available in Section 4.8 of the text.

2. The source for the discussion on interference is sent through a separate attachment.

3. The discussion on random processes closely follows that in Sections 8.6–8.11 of the text.

4. Consider an FM signal for which the message is a step input of amplitude A, i.e., $m(t) = Au(t)$. The FM signal will be given by $s(t) = A\cos\left(2\pi f_c t + k_f A\int_0^t u(x)dx\right)$. If this is modulated by a first order PLL, determine the expression for the demodulated output. This was worked out in class.

5. For the preceding problem, sketch the input phase deviation, the phase deviation of the VCO output and the phase error.

6. Repeat the previous problems for for$m(t) = A\cos 2\pi f_m t$.

7. Consider an FM discriminator in the presence of a sinusoidal interference. Show that the output is a non zero constant for the following cases: $A_i = A_c$, $A_i = -A_c$, and $A_i >> A_c$. Dtermine the discuminator output for each of these cases.

8. Solve problems 8.27–8.29 from the text.