

Set #3

Due Date Monday October 11, 2021

Problems

1. Z&T 7.15.
2. Z&T 7.21.
3. Z&T 7.27.
4. Z&T 7.31.
5. Z&T 9.5.
6. Z&T 9.7. Include Computer Exercise 9.2, so you can plot P_E versus E_b/N_0 in dB for timing errors. Plot a family BEP curves as the timing error increases for 0 to 25% of the bit time. The BEP plot axis should be similar to the plots in the notes.
7. Z&T 9.9.
8. Z&T 9.10. For 20 bonus points. The problem statement for this problem contains an error. The optimum threshold you must show is

$$k_{\text{opt}} = \frac{\sigma_0^2}{s_{02}(T) - s_{01}(T)} \ln\left(\frac{p}{q}\right) + \frac{s_{02}(T) + s_{01}(T)}{2}$$

To perform the optimization it is helpful to know Leibnitz' rule for differentiating definite integrals, i.e.,

$$\frac{d}{d\alpha} \int_{\phi_1(\alpha)}^{\phi_2(\alpha)} F(x, \alpha) dx = \int_{\phi_1(\alpha)}^{\phi_2(\alpha)} \frac{\partial}{\partial \alpha} F(x, \alpha) dx + F(\phi_2, \alpha) \frac{d\phi_2(\alpha)}{d\alpha} - F(\phi_1, \alpha) \frac{d\phi_1(\alpha)}{d\alpha}$$

9. Z&T 9.13.