1. In sequential detection, we have \(1 - P_D \leq B(1 - P_F)\). Prove this inequality.

2. With the notation defined in the notes, prove that when \(E\{z_j|H_1\} = 0\), \(E\{N|H_1\} = -ab/\text{var}(z_j|H_1)\).

3. Consider a sequence of i.i.d. Bernoulli observations, \(Y_1, Y_2, \ldots\), with distribution

\[
P(Y_k = 1) = 1 - P(Y_k = 0) = 1/3
\]

under hypothesis \(H_0\), and

\[
P(Y_k = 1) = 1 - P(Y_k = 0) = 2/3
\]

under hypothesis \(H_1\).

Use Wald’s approximations to suggest values of \(A\) and \(B\) so that the SPRT\((A, B)\) has maximum error probability \(p^* = \max(P_F, P_M)\) approximately equal to 0.01. Describe the resulting test in detail. Also, using Wald’s approximations, give an approximation to the expected sample sizes \(E\{N|H_0\}\) and \(E\{N|H_1\}\).