Principles of Communication Systems
Columbia University
ELEN E3701
Spring Semester- 2008

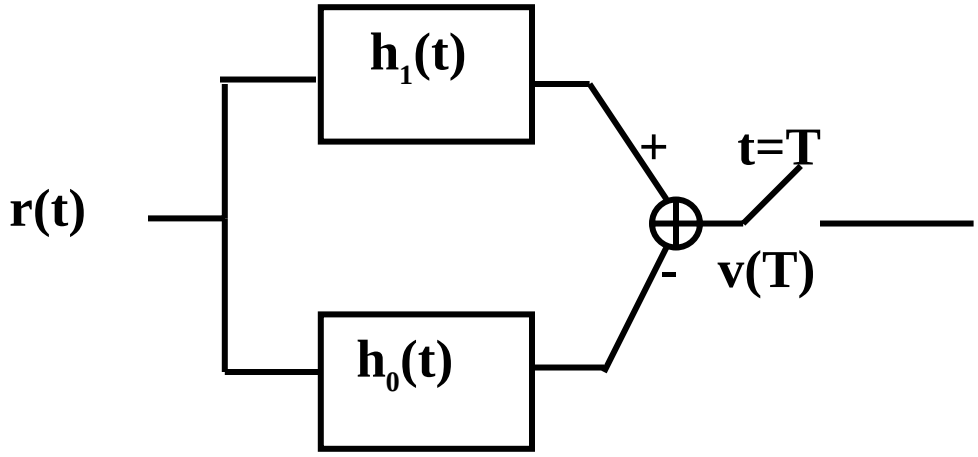
Problem Set # 10

Problems Due: 23 April 2008

Problem #1

Show that at the sampling time T, the difference between the two voltages from the two matched filters shown below, is exactly equal to the output of the correlation detector (see equation below) which we studied in class. Therefore, we can use the two matched filters instead of the correlation detector, and get the same results for probability of error.

$$h_1(t)=\sqrt{E_1}\, s_1(T-t)$$



$$h_0(t)=\sqrt{E_0}\, s_0(T-t)$$

$$v(T)=\int_0^T \sqrt{E_1}\, s_1(t)\, r(t)\, dt - \int_0^T \sqrt{E_0}\, s_0(t)\, r(t)\, dt$$