2.58)

The output of the filter matched to $s_1(t)$ and $s_1(t)$ is:

$$y_s(t) = \begin{cases} 
    t & t < T/2 \\
    T - t & T/2 \leq t < T \\
    0 & \text{elsewhere}
\end{cases}$$

The peak value of $y_s(t)$ occurs at $t = T/2$ and is equal to $y_s(T/2) = T/2$.

The output of the filter matched to $s_1(t)$ and $s_0(t)$ is:

$$y_s(t) = \begin{cases} 
    t - T/2 + \Delta & T/2 - \Delta < t < T - \Delta \\
    3T/2 - \Delta & T - \Delta \leq t < 3T/2 - \Delta \\
    0 & \text{elsewhere}
\end{cases}$$

At $t = T/2$, $y_s(T/2) = \Delta$.

The detection threshold should be halfway between $\Delta$ and $T/2$ or at $T/4 + \Delta/2$. The lowest BER rate will occur when the separation between $y_s(T/2)$ and $y_s(T/2)$ is greatest. This occurs when $\Delta = 0$.

2.39)

a) $N = 7$

b) SNR (dB) = 39.64 dB

2.42)

a) Use $f_s = 1500$ Hz

b) $N = 3$