

S-72.341 CODING METHODS

Tutorial 9

1. (Wicker, problem 12.9) Assume that the encoder from Problem 12.1 (see the book) is used over a symmetric memoryless channel. The bit metrics are as follows.

$y \backslash r$	<u>0</u>	0	1	<u>1</u>
$y = 0$	0	1	3	6
$y = 1$	6	3	1	0

Find the maximum-likelihood code word corresponding to the following received sequence. $\mathbf{r} = (\underline{10}, 01, \underline{10}, \underline{11}, 00, \underline{10}, \underline{11}, 00)$.

2. (Wicker, problem 15.1) Hamming code is used in a pure ARQ protocol over a binary symmetric channel with crossover probability $p = 0.05$. Each packet consists of a single code word. The application has a 3 km, free space, line-of-sight channel. The transmitter has a 10^6 bit-per-second transmission rate, and the receiver processing delay is negligible. The feedback channel is assumed to be error-free. Determine the throughput for the following three protocols.
 - a) SW-ARQ
 - b) GBN-ARQ
 - c) SR-ARQ.
3. (Wicker, problem 15.2) Determine the reliability performance for the system described in Problem 2.
4. (Wicker, problem 15.4) Repeat Problem 2, but this time assume that each packet consists of four code words. What is the probability of retransmission as a function of channel crossover probability when each packet consists of n code words?
5. (Wicker, problem 15.5) Repeat Problem 2 but this time assume that the feedback channel has an error rate of $P_{AKC \rightarrow RQ} = P_{RQ \rightarrow AKC} = 0.2$.