Rowan University

ELECTRICAL & COMPUTER ENGINEERING

ELECTRICAL COMMUNICATION SYSTEMS

ECE 09433

Homework 4

Please write your name, your class session, and your lecturer's name on your solutions. Numbers are from the textbook.

Problem 1 This is not from Textbook

A Pulse code modulation (PCM) signal is a binary signal. The digital PCM is converted from an analog signal. The bandwidth of the analog signal is 1kHz. To convert the analog signal to the digital signal, the voltage of each sampling point is divided into 8 levels.

(a) What is the baud (symbol rate) for this PCM signal?

(b) What is the bit rate for this PCM signal?

(c) What is the minimum bandwidth for a communication system to transmit this PCM signal (in unit of kHz)?

Problem 2 Textbook 3-21

A multilevel digital communication system sends one of 16 possible levels over the channel every 0.8ms

(a) What is the number of bits corresponding to each level? Or in another word, how many bits in each symbol? Note that the levels in this problem are different from the levels in the last problem. In the last problem, levels are from analog to digital conversion, while in this problem, the digital signal itself is a multilevel signal.

(b) What is the baud (symbol rate)?

(c) What is he bit rate?

Problem 3 This is not from Textbook

The input of a differential coding signal is

10110010

Begin with the reference digit "1", what is the encoded sequence?

In your solution, please label, which digit is reference digit, which digits are encoded sequence.