Chapter1: 16,17 No solutions provided. Trivial problems. Contact TA if require solutions

Chapter 3:

Problem 17: If two adjacent signal levels are separated by more than 2/16 then the noise cannot translate one adjacent signal into the next. The maximum range that the signal can span is +1-(-1)=2, so the maximum number of levels is 2/(1/8)=16

Problem 18:

1. w = 2.4Khz SNR=20dB
   An SNR of 20dB corresponds to a value of 100. The channel capacity formula then gives
   $C = 2400 log_2(1 + 100) = 15979\ bps$
2. $C = 2400 log_2(1 + 10000) = 31890\ bps$
3. $C = 3000 log_2(1 + 100) = 19974\ bps$
4. $C = 3000 log_2(1 + 10000) = 39863\ bps$

Problem 40:

- If we rearrange the 2n information bits and the 2 parity bits into codewords, each consisting of n information bits and a parity bit, we see that in effect we have divided the overall codeword into two subcodewords of lenth n+1. an error pattern is detectable if the error pattern in each subcodeword is detectable if the number of errors in the subcodeword is an odd.
- An error detection failure occurs in either the first subcodeword or the second subcodeword or both fail. Let $P_{detect}(n + 1)$ be the probability of successful error detection in the single parity code of length $n + 1$, then
  P[detection failure in code of length 2n+2] =
  = 1- P[successful detection in both codes of length n+1]
  $=1 - P_{detect}(n + 1) * P_{detect}(n + 1)$
- No, it should not.

Problem 41: Using polynomial arithmetic we obtain, codeword = 1001110 and the remainder as 101 which is erroneous cause remainder on the received codeword should be zero.

Problem 43: The Internet checksum is calculated as:
$b_0 = 1111111111111111 = 2^{16} - 1 = 65535$
$b_1 = 1111111100000000 = 65280$
$b_2 = 1111000011110000 = 61680$

$b_3 = 1100000011000000 = 49344$
$x = b_0 + b_1 + b_2 + b_3 modulo 65535 = 241840 modulo 65535 = 45235$
i$b_4 = -x modulo 65535 = 20300$ So the internet checksum is = 0100 1111 0100 1100