Câu 1 :

a.

Information bits:110111

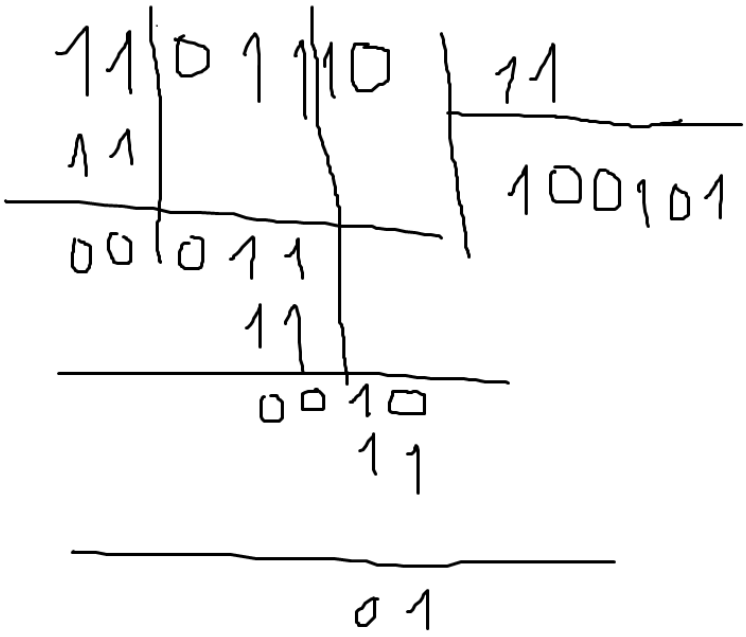
g1(x)=x+1=>Degree of the g1(x) is 1

// Ngầm hiểu:(Nháp) bit của g1 là 11

Because g1(x) is used as the generating polynomial

=> Codeword:110111a

// Trình bày phép chia ....



=> R=1

=>Codeword:1101111

b)

Information bits:110111

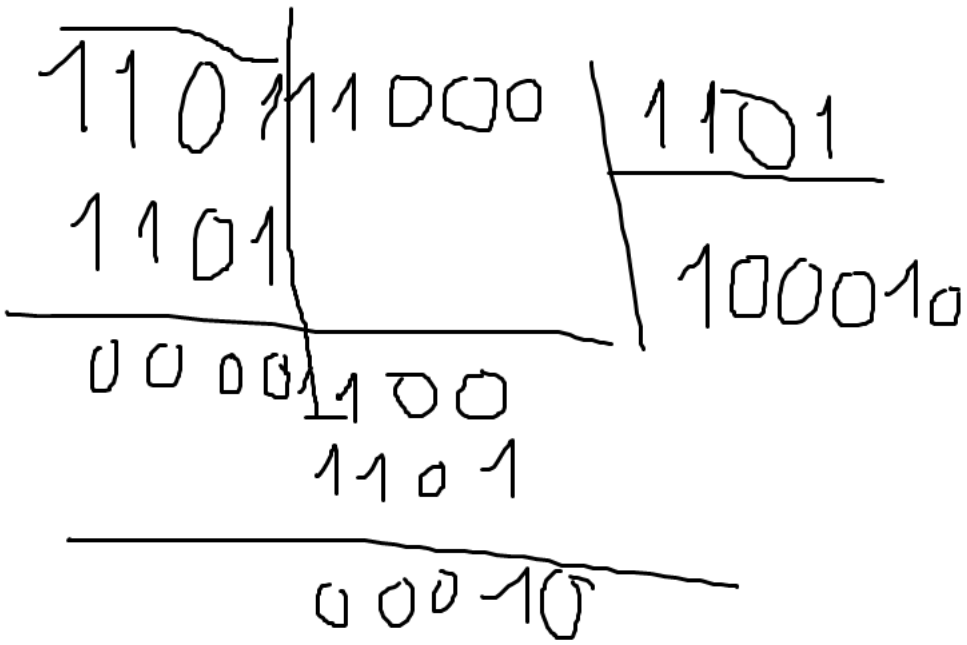
G2(x)=x^3+x^2+1=>Degree of the g2(x) is 3

// Ngầm hiểu:(Nháp) bit của g2 là 1101

Because g2(x) is used as the generating polynomial

=>Codeword:110111aaa

// Trình bày phép chia:



R= 010

=>Codeword:110111010

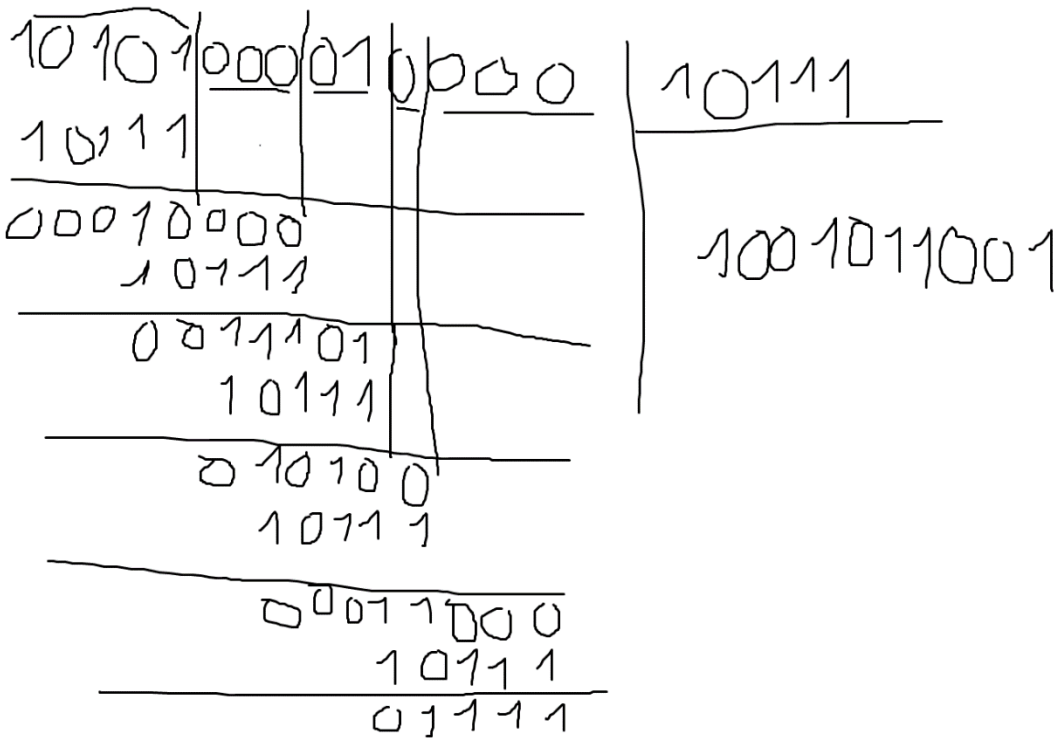
Câu 2:

G=10111 => Degree of G is 4

D= 1010100001

Codeword:1010100001aaaa

// Trình bày phép chia:



R=1111

Câu 3 : https://www.youtube.com/watch?v=ID_o6tz5SfI&t=48s

Câu 4: a)

If a packet with an IP address 135.46.63.10
arrives

Taking 22 bits of 135.46.63.10 :

135.46.63.10 ⇔ 1000 0111.0010 1110.0011 1111.00001010

It will arrives to the Interface 1 with the IP address of : 135.46.60.0 or 1000 0111.0010 1110.0011 1100.00000000

b)

If a packet with an IP address 135.46.57.14
arrives:

Taking 22 bits of 135.46.57.14:

135.46.57.14 ⇔ 1000 0111.0010 1110.0011 1001.00001110

It will arrives to the Interface 0 with the IP address of : 135.46.56.0 or 1000 0111.0010 1110.0011 1000.00000000

câu 5

Suppose two hosts, A and B, are separated by 30,000 kilometers and are connected by a direct link of R = 3 Mbps. Suppose the propagation speed over the link is 2.5 x 108 meters/sec.

a. Calculate the bandwidth-delay product, R _ dprop.

b. Consider sending a file of 900,000 bits from Host A to Host B. Suppose the file is sent continuously as one large message. What is the maximum number of bits that will be in the link at any given time?

Câu .5 a):

The distance from A to B is 30000 km = 3*10^7 m

R=3 Mbps =3 *10^6(bps)

S(speed)=2,5*10^8 meters/sec

The propagation delay is:

d(prog) =Distance/S= 3*10^7/2.5*10^8= 0.12 sec

The band-width delay product is:

R * d(prog) = 3*10^6 * 0.12 = 36*10^4 bits

Band-width delay product is 360000 bits

b) Because band-width delay product is 360000 bits so file of 900000 bits can only have 360000 bits to link at any given time.

B) Size of a file is 900000 bits= 9*10^5 bits

Vẫn y như đáp án câu A, số bits lớn nhất là 360000 bits

Câu 6 :

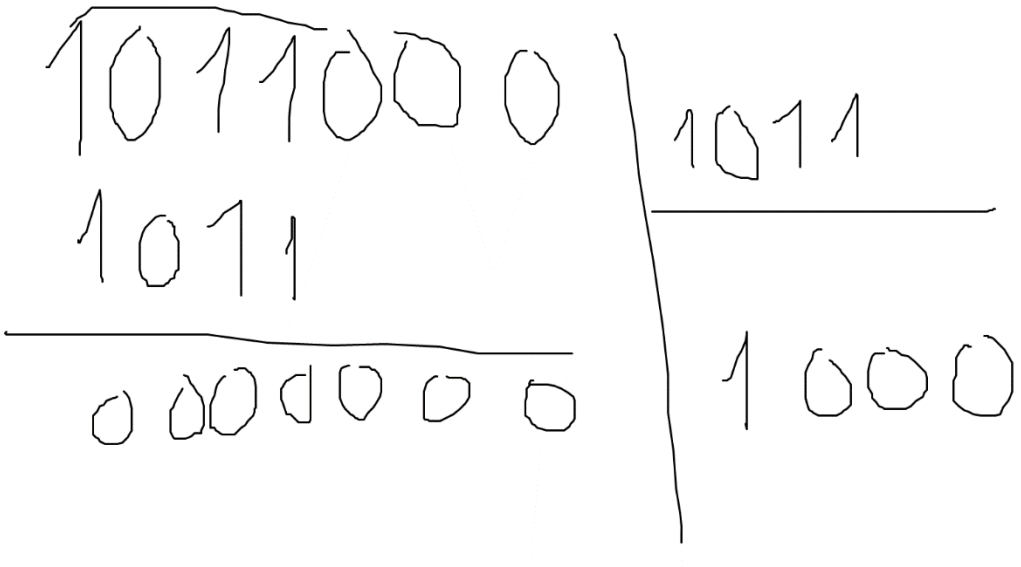
g(x)=x^3+x+1 => Degree of g(x) is 3

// Ngầm hiểu g(x) dạng bit của nó sẽ là 1011

=>Codeword:1011aaa

Using polynomial arithmetic we obtain:

// Trình bày phép chia



R =000

=>Codeword:1011000

câu 7:

7. A packet switch receives a packet and determines the outbound link to which the packet should be forwarded. When the packet arrives, one other packet is halfway done being transmitted on this outbound link and four other packets are waiting to be transmitted. Packets are transmitted in order of arrival.

Suppose all packets are 2,500 bytes and the link rate is 3 Mbps. What is the queuing delay for the packet? More generally, what is the queuing delay when all

packets have length L, the transmission rate is R, x bits of the currently-being-transmitted packet have been transmitted, and n packets are already in the queue?

We have:

package length = L

transimision rate = R

currently transimitted packet = x bits

Waiting queue = n package

Queuing delay = [(nL) + (L-x)] *R(Mbps)*n/R(bps)

We have:

L = 2500 bytes

R = 3 Mbps = 3*10^6 bps

x = 2500/2 = 1250 (transmit halfway)

n = 4(as it is given)

[nL + (L-x)] = [(4*2500) + (2500-1250)]

10000 + 1250 = 11250 bytes

-Package transmit rate at 3Mbps

11250*3*4=135000

-Queuing delay = 135000/3*10^6 = 0.045 sec

Câu 8:

B_0= 11111111 11111110 = 65534

B_1= 11111111 00000000= 65,280

B_2= 11110000 11110000 = 61,680

B_3= 11000000 11000001 = 49,345

x=B_0 + B_1 +B_2 +B_3 modulo 65535 = 65534+65280+61680+49345 modulo 65535 = 241839 modulo 65535=45234

B_4=-x modulo 65535 = 20301

// Đổi 20301 về binary

Internet checksum :0 100 1111 0100 1101

Câu 9 :

9. Consider a packet of length 2,000 bytes that propagates over a link of

distance 3,500 km with propagation speed of 2,5*10^8 m/s, and transmission

rate

2 Mbps?

a. How long does the packet propagation take?

b. Does this propagation delay depend on the packet length?

c. Does this propagation delay depend on the transmission rate?

We have:

L = 2000 bytes

// length =L

R = 2Mbps = 2*10^6 bps

distance = 3500km=3500*10^3 m

S (Speed) = 2.5*10^8 m/s

giải

A) time = distance/Speed = (3500*10^3)/(2.5*10^8) = 0.014s = 14ms

//14ms = 14mili giây

B) Does this propagation delay depend on the packet length? (no) |Lý thuyết nên đừng hỏi :))

C) Does this propagation delay depend on the transmission rate?(no) |

Câu 10:

Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1 = 250 kbps, R2 = 3 Mbps, and R3 = 2 Mbps.

a. Assuming no other traffic in the network, what is the throughput for the file transfer?

b. Suppose the file is 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

We have

R1 = 250 kbps

R2 = 3 Mbps

R3 = 2 Mbps

A) the throughput for the file

transfer = min{R1,R2,R3}= min{250 kbps, 3 Mbps, 2 Mbps} = 250kbps

B) the file size = 4 million bytes =4000000

-convert to bits = 32000000 bits

-From (a), Throughput for the file transfer=250 Kbps = =250000 bps

The time it take to transfer the file to host B is:

Time= File size/Throughput for the file transfer = 32000000/250000 = 128 giây(second)

1TB=1*10^3 gb=1*10^6mb=1*10^9kb=1*10^12bytes

Câu 11 :

11)Suppose an application layer entity wants to send an L-byte message to its peer process, using an existing TCP connection. The TCP segment consists of the message plus 20 bytes of header. The segment is encapsulated into an IP packet that has an additional 20 bytes of header.
The IP packet in turn goes inside an Ethernet frame that has 18 bytes of header and trailer. What percentage of the transmitted bits in the physical layer correspond to message information, if L = 200 bytes, 1000 bytes, 2000 bytes? [3 marks – 1 mark each]

/// Trình bày:

TCP/IP over Ethernet allows data frames with a payload size up to 1460 bytes. Therefore, L = 200, 1000 bytes are within this limit.

//2000 >1460 rồi :v

The message overhead includes:

• TCP: 20 bytes of header

• IP: 20 bytes of header

• Ethernet: total 18 bytes of header and trailer.

Therefore

L = 200 bytes, 200/258 = 78% efficiency (1).

//200/(200+58) và 58 là tổng của TCP+IP+Ethernet và tương tự cho các câu dưới

L = 1000 bytes, 1000/1058 = 95% efficiency (1).

12)Suppose the size of an uncompressed text file is 1 megabyte.

a)How long does it take to download the file over a (notice here)35 Kilobit per second modem?

b) How long does it take to take to download the file over a 1 megabit per second modem?

c)Suppose data compression is applied to the text file. How much do the transmission times in a) and b) change?

If we assume a maximum compression ratio of 1:6(// mình hiểu là 6 lần), then we have the following
times for the 35 kilobit and 1 megabit lines respectively:

a)

Size: 1 megabyte = 8*1 048 576 bit(//Đề cho text file có size 1 megabyte)

Rate: 35 Kilobit/s = 35000 bit/s

Time: T = 8*1 048 576 bit / 35000 bit/s = 239,67s.

b:

Rate: 1 megabit/s = 1000 000 bit/s

Time: T = 8*1 048 576 bit / 1000 000 bit/s = 8,388608 s.

c:

After compression:

Size: 8*1 048 576 bit / 6 = 1398101,333 bit = 1398101 bit

Rate: 35000 bit/s

Time: T = 1398101 bit / 35000 bit/s = 39,945 s.

Rate: 1000 000 bit/s

Time: T = 1398101 bit / 1000 000 bit/s = 1,398101s.

Câu 13 : // Đáp án

a) In a three-way handshake procedure, one must ensure the selection of the initial sequence number is always unique. If station B receives an old SYN segment from A, B will acknowledge the request based on the old sequence number. When A receives the acknowledge segment from B, A will find out that B received a wrong sequence number. A will discard the acknowledgement packet and reset the connection.

b) If an old SYN segment from A arrives at B, followed by an old ACK segment from A to a SYN segment from B, the connection will also be rejected. Initially, when B receives an old SYN segment, B will send a SYN segment with its own distinct sequence number set by itself. If B receives the old ACK from A, B will notify A that the connection is invalid since the old ACK sequence number does not match the sequence number previously defined by B. Therefore, the connection is rejected.

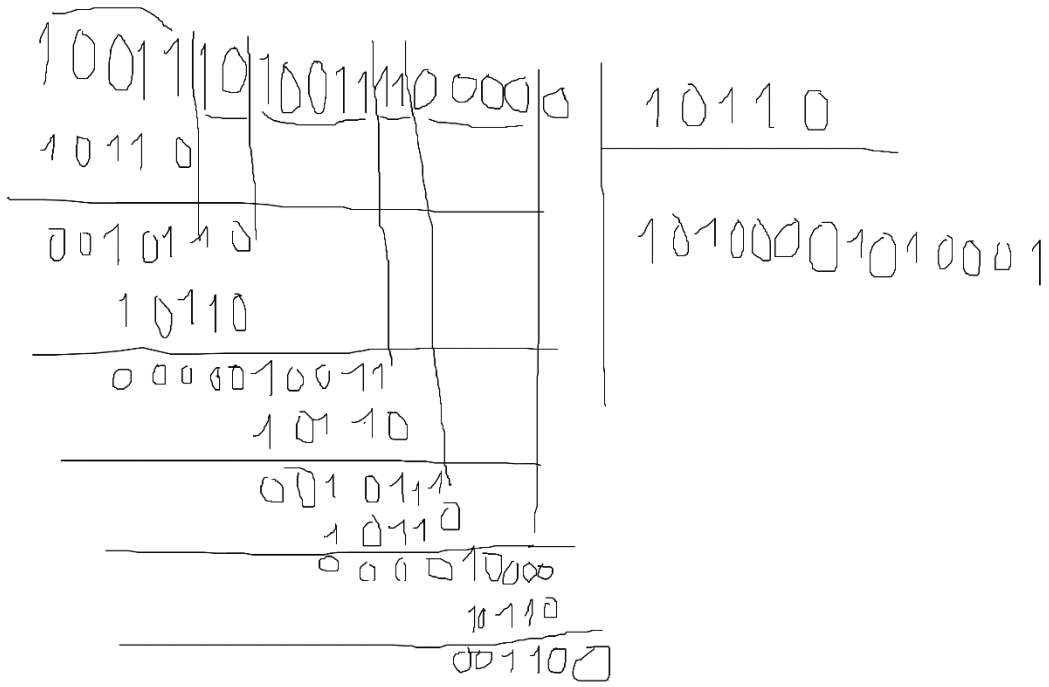
Câu 14:

D= 100111010011110

G=10110=> Degree of G is 4

= > Codeword : 100111010011110aaaa

// Trình bày phép chia

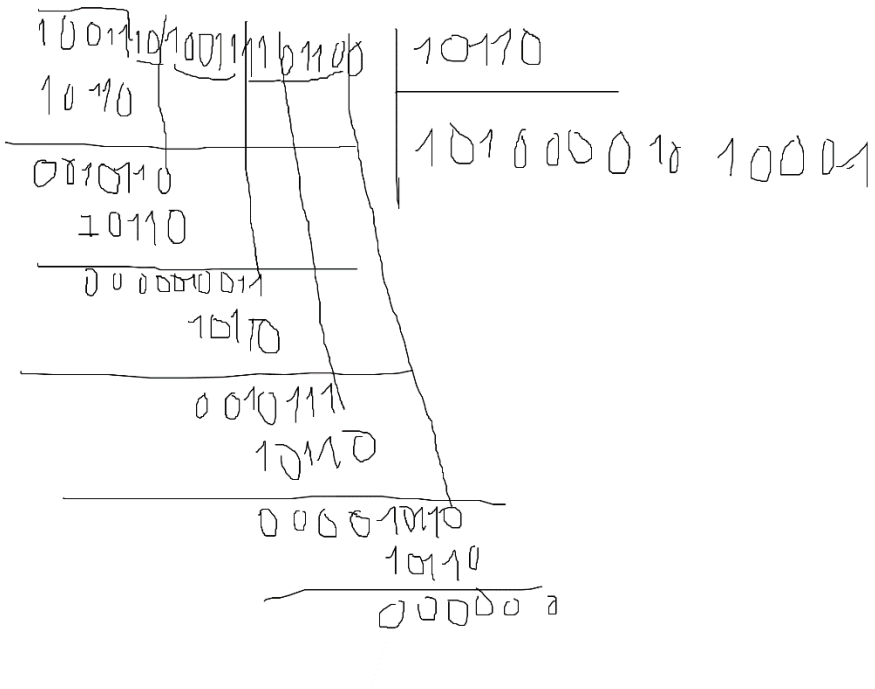


So R =1100

=>Codeword : 10011101001111011100

Using CRC Algorithm to check for error again, we have :

// Mình trình bày phép chia codeword đã tìm được cho cái kia lại lần nữa với mục đích là áp dụng CRC Algorithm để xem có lỗi truyền data vào hay không:



// Chia không dư => True => CRC algorithm trả về giá trị đúng

=>No error was made during the transmission

// Ví dụ chia có dư => CRC algorithm trả về giá trị sai thì ghi:

// There was an error during the transmission

// => Bit string will not be transmitted through polynomial bits string 10110

=> The bits string is 10011101001111011100