Problem 1

Cyclic Redundancy Check
Consider the 6-bit generator G = 110011, and suppose that D has the value 11100011.
a) What is the value of R (CRC bits)?
b) What is the frame transmitted?
c) How does the receiver know if the frame it received is correct or not?

a) R = 11010 to get this is did the long division of 1110001100000/110011
b) Frame being transmitted is D + R = 1110001100000+11010 = 1110001111010
c) The receiver knows if the frame is correct or not by doing the long division again with G and the D+R value and if the remainder is 0 then there are no errors

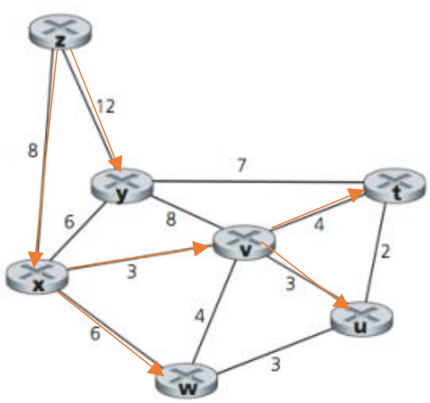
Problem 2

Repeat the above question with the 5-bit generator G = 11001 and the message D = 11100110.

a) R = 110
b) D+R = 111001100000 + 110 = 111001100110
c) Same thing if we check the long division and the remainder is 0 then there are no errors

Problem 3

Given the following network, using the Dijkstra's algorithm and showing your work using a table similar to Table 5.1 (Table 4.3 in the 6th edition), compute the shortest path from node **z** to all network nodes.

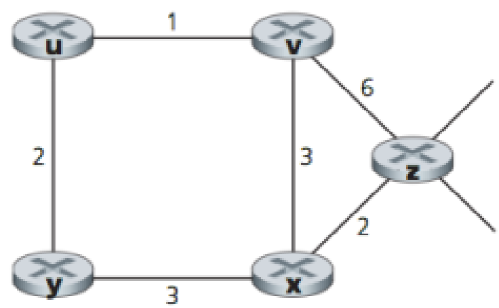


Step	N	D(t)p(t)	D(v)p(v)	D(u)p(u)	D(x)p(x)	D(w)p(w)	D(y)p(y)
0	Z	Inf	Inf	Inf	8,z	Inf	12,z
1	Zx	Inf	11,x	Inf	8,z	14,x	12,z
2	Zxv	15,v	11,x	14,v	8,z	14,x	12,z
3	Zxvu	15,v	11,x	14,v	8,z	14,x	
4	Zxvuy	15,v		14,v			
5	Zxvuyw						
6	zxvuywt						

We can see from this graph that all nodes are covered and we can see that to node z the shortest path from every node is listed so I will add a path that shows the fastest routes. Meaning that to get to T from Z would take 8+3+4 =15 cost or u to z would be 8+3+3 = 14 etc.

Problem 4

Given the following network, show the distance table entries at node **z**, assuming distance vector routing and that each node initially knows the costs to each of its neighbours.



			Cost			
		u	**v**	**x**	**y**	**z**
From	**v**	Inf	Inf	Inf	Inf	inf
	x	Inf	Inf	Inf	Inf	Inf
	z	Inf	6	2	Inf	0

			Cost			
		u	**v**	**x**	**y**	**z**
From	**v**	1	0	3	Inf	6
	x	inf	3	0	3	2
	z	Inf	6	2	Inf	0

			Cost			
		u	**v**	**x**	**y**	**z**
From	**v**	1	0	3	3	5
	x	4	3	0	3	2
	z	6	5	2	5	0

Problem 5

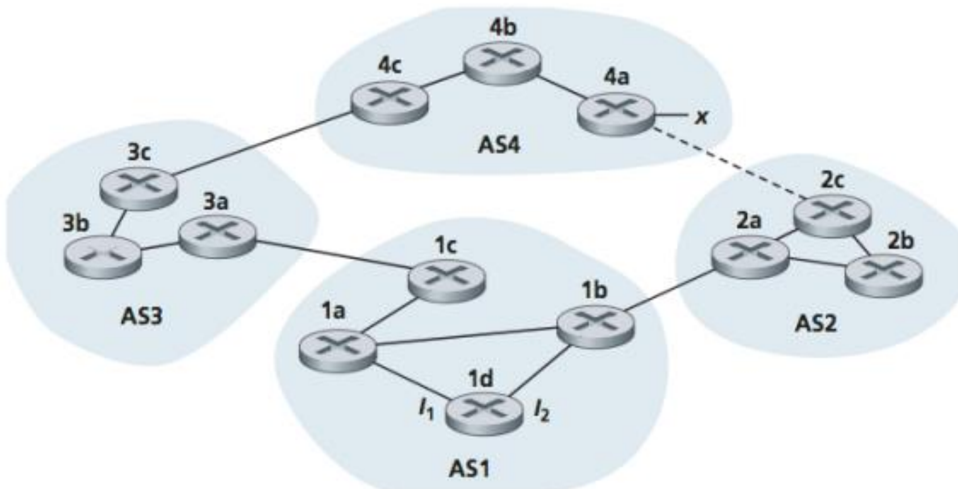
Consider the network shown below. Suppose AS3 and AS2 are running OSPF for their intra-AS routing protocol. Suppose AS1 and AS4 are running RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol. Initially suppose there is *no* physical link between AS2 and AS4.

a. Router 3c learns about prefix *x* from which routing protocol: OSPF, RIP, eBGP, or iBGP?

b. Router 3a learns about *x* from which routing protocol?

c. Router 1c learns about *x* from which routing protocol?

d. Router 1d learns about *x* from which routing protocol?



A) Router 3c would learn about x from eBGP
B) Router 3a would learn about x from iBGP
C) With eBGP
D) iBGP

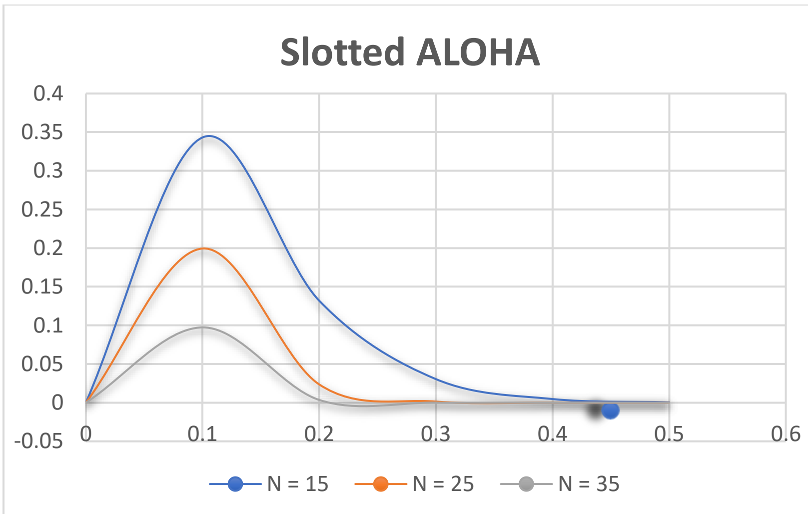
Problem 6

Graph the efficiency of slotted ALOHA and pure ALOHA as a function of *p* for the following values of *N*:

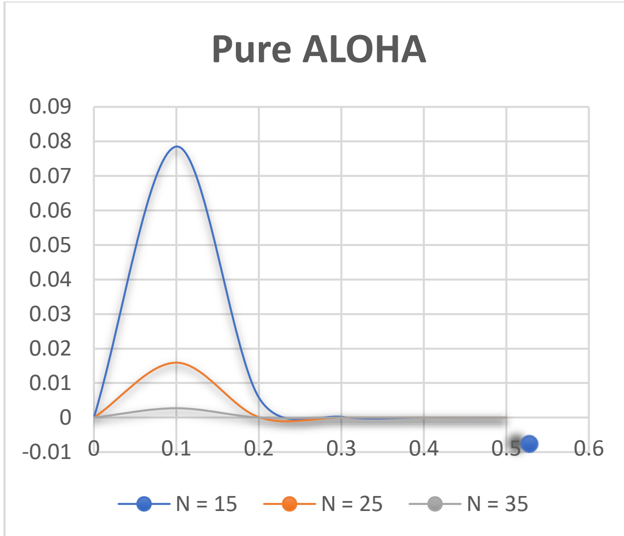
a. *N*=15.

b. *N*=25.

c. *N*=35.



p	e		
	n = 15	n = 25	n = 35
0	0	0	0
0.1	0.343151	0.199	0.09734
0.2	0.131941	0.0236	0.003549
0.3	0.030520	0.0014	5.682E-05
0.4	0.00470	4.74E-05	4.011E-07
0.5	0.000457	7.45E-07	1.018E-09



p	e		
	n = 15	n = 25	n = 35
0	0	0	0
0.1	0.07850	0.01590	0.00270
0.2	0.00580	0.000111	1.7997E-06
0.3	0.000206	2.752E-07	3.0750E-10
0.4	3.684E-06	2.245E-10	1.149E-14
0.5	2.793E-08	4.440E-14	5.929E-20

Problem 7

Recall that with the CSMA/CD protocol, the adapter waits $K \cdot 512$ bit times after a collision, where K is drawn randomly. For $K = 100$, how long does the adapter wait until returning to Step 2 for a 10 Mbps broadcast channel? For a 100 Mbps broadcast channel?

Since K * 512 bits we can see that its 51200 bits so for a 10 Mbps signal it would be bit time / bps

Which would be 5.12 ms, other wise for a 100 Mbps broadcast channel the wait time would be 0.512 ms

Problem 8

Let's consider the operation of a learning switch in the context of a network in which 6 nodes labeled A through F are star connected into an Ethernet switch. Suppose that *(i)* B sends a frame to E, *(ii)* E replies with a frame to B, *(iii)* A sends a frame to B, *(iv)* B replies with a frame to A. The switch table is initially empty. Show the state of the switch table before and after each of these events. For each of these events, identify the link(s) on which the transmitted frame will be forwarded, and briefly justify your answers.

i) **B sends a frame to E**
State: Switch learns interface corresponding to mac of b
Link forwarded to: a,c,d,e and f

- The switch doesn't know the interface corresponding to mac of e since switch table is empty

ii) **E replies with a frame to B**
State: Switch learns interface corresponding to mac of e
Link forwarded to: b

- The switch knows interface corresponding to mac of b

iii) **A sends a frame to B**
State: Switch learns the interface corresponding to mac of a
Link forwarded to: b

- The switch already knows the interface corresponding to mac of b

iv) **B replies with a frame to A**
State: Switch table state remains the same
Link forwarded to: a

- The switch already knows the interface associated with mac of a