Question 1

```
           11100000011
     -----------------
1101 ) 101101100101000
      -01101
      ------
        10011
       -01101
       ------
          1101
         -1101
         -----
                10100
               -01101
               ------
                  1110
                 -1101
                 -----
                     1

CRC: 001
Msg: 101101100101001
```

Question 2

a) See below for Bellman-Ford and Dijkstra rounting tables

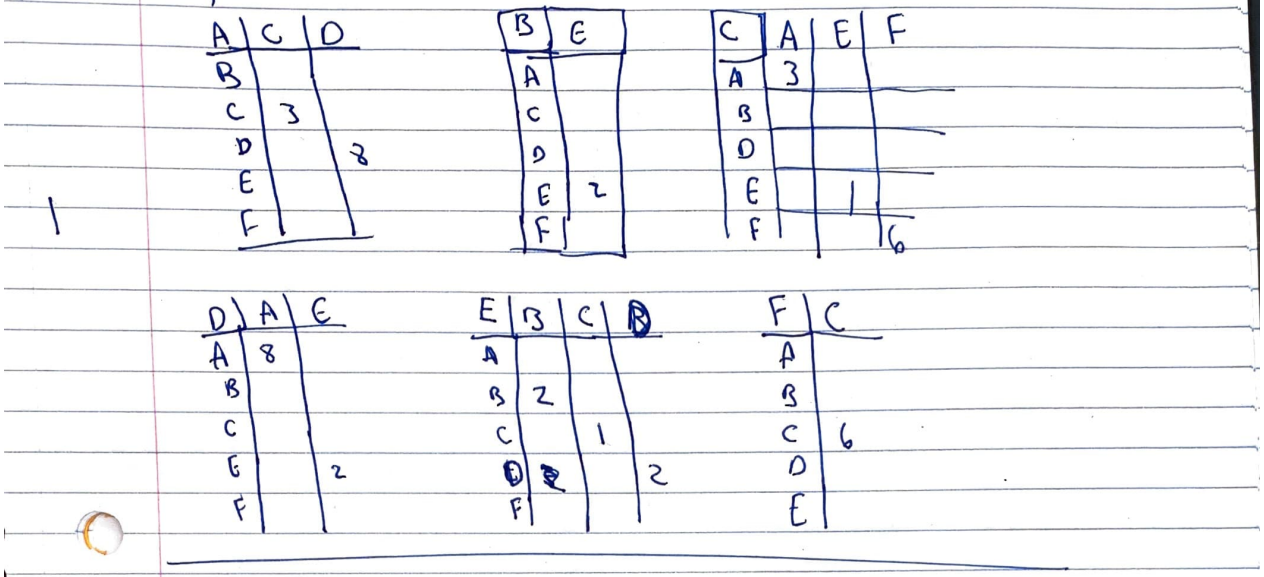
It took four iterations (including the initialization) to complete the Bellman-Ford algorithm over all of the nodes. The order in which the edges are evaluated will not have an effect of the final output of the algorithm though it may or may not settle some nodes in earlier iterations.

c)

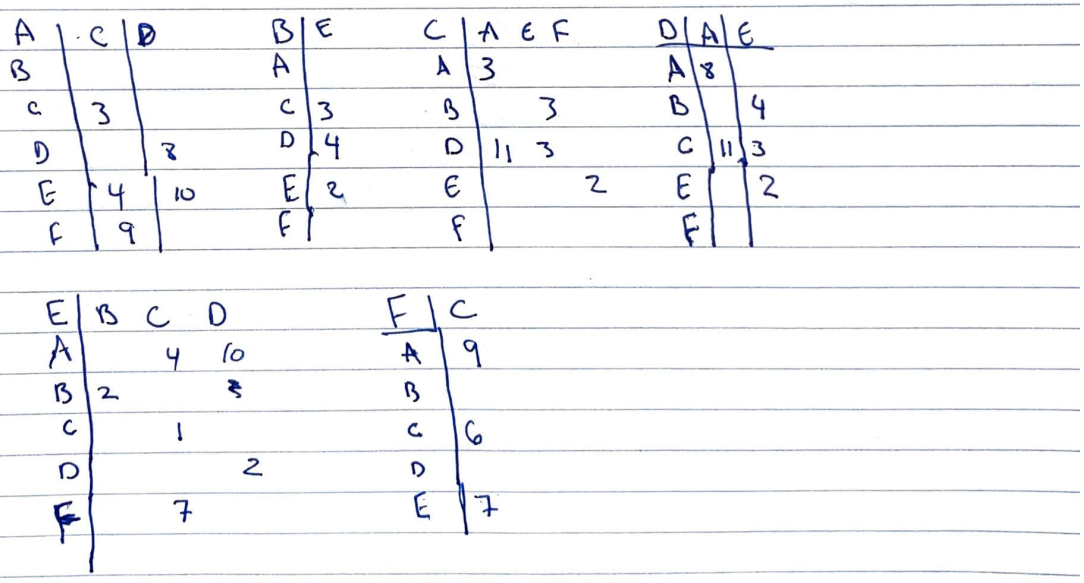
The Bellman Ford algorithm will send fewer messages but it must synchronize its messages over all of the nodes. This operation may cause considerable slowdown. Dijkstra's algorithm will require more network bandwidth as each node will perform its resolution of the entire network on its own. Put simpler, Bellman Ford will require all the nodes to work together to build the routing table, whereas Dijkstra will require each individual node to build the table on its own.

2)

a)


A C D
B
C 3
D 8
E
F
B E
A
C
D
E 2
F
C A E F
A 3
B
D
E 1
F 6
D A E
A 8
B
C
E 2
F
E B C D
A
B
C 1
D 2
F
F C
A
B
C 6
D
E

2)


A C D
B
C 3
D 8
E 4 10
F 9
B E
A
C 3
D 4
E 2
F
C A E F
A 3
B 3
D 11 3
E 2
F
D A E
A 8
B 4
C 11 3
E 2
F
E B C D
A 4 10
B 2 3
C 1
D 2
F 7
F C
A 9
B
C 6
D
E 7

	A	C	D
B	6	12	
C	3	11	
D	6	8	
E	4	10	
F	9		

	B	E
A	6	
C	3	
D	4	
E	2	
F	9	

	C	A	E	F
A	3	5		15
B		3		
D	11	3		
E	7	1		13
F	12	8		6

	D	A	E
A	8	6	
B		4	
C	11	3	
E	12	2	
F	17	9	

3

	E	B	C	D
A			4	10
B	2		4	6
C	5		1	5
D	6		4	2
F			7	

	F	C
A	9	
B	9	
C	6	
D	9	
E	7	

	A	C	D
B	6	12	
C	3	11	
D	6	8	
E	4	10	
F	9	17	

	B	E
A	6	
C	3	
D	4	
E	2	
F	9	

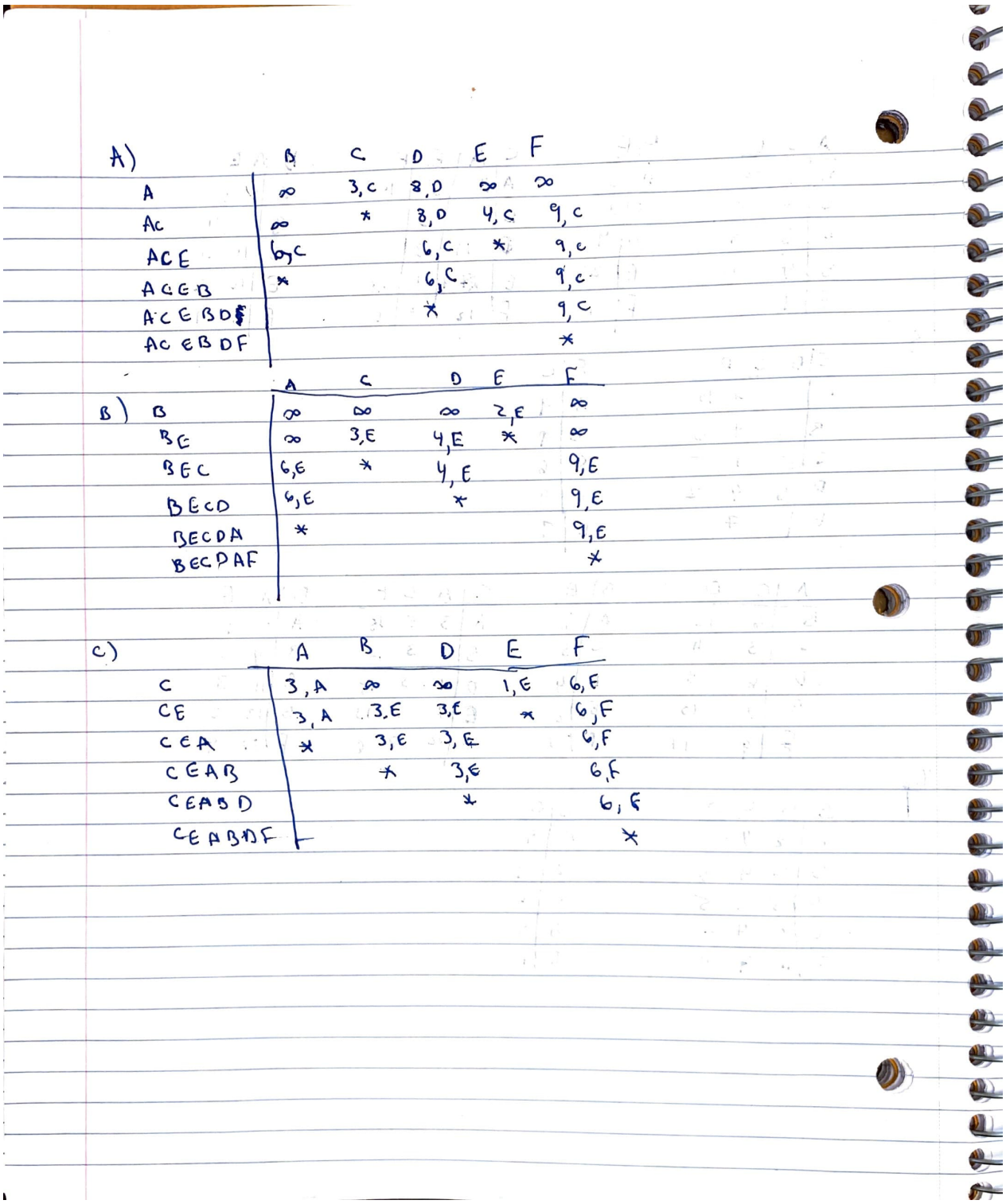
	C	A	E	F
A	3	5		15
B	9	3		15
D	9	3		15
E	7	1		13
F	12	8		6

	D	A	E
A	8	6	
B	14	4	
C	11	3	
E	12	2	
F	17	9	

4

	E	B	C	D
A	8	4	8	
B	2	4	6	
C	5	1	5	
D	6	4	2	
F	11	7	11	

	B	C
A	9	
B	9	
C	6	
D	9	
E	7	



A)

	B	C	D	E	F
A	∞	3,C	8,D	∞	∞
AC	∞	*	8,D	4,C	9,C
ACE	6,C		6,C	*	9,C
ACEB	*		6,C		9,C
ACEBD			*		9,C
ACEBDF					*

B)

	A	C	D	E	F
B	∞	∞	∞	2,E	∞
BE	∞	3,E	4,E	*	∞
BEC	6,E	*	4,E		9,E
BECD	6,E		*		9,E
BECDA	*				9,E
BECDAF					*

C)

	A	B	D	E	F
C	3,A	∞	∞	1,E	6,F
CE	3,A	3,E	3,E	*	6,F
CEA	*	3,E	3,E		6,F
CEAB		*	3,E		6,F
CEABD			*		6,F
CEABDF					*

D)

	A	B	C	E	F
D	8, A	∞	∞	2, E	∞
DE	8, A	4, E	3, E	*	∞
DEB	6, E	4, E	*		9, E
DECB	6, E	*			9, E
DECBA	*				9, E
DECBAF					*

E)

	A	B	C	D	F
E	∞	2, B	1, C	2, D	∞
EC	4, C	2, B	*	2, D	7, C
ECB	4, C	*		2, D	7, C
ECBD	4, C			*	7, C
ECBDA	*				7, C
ECBDAF					*

F

	A	B	C	D	E
F	∞	∞	6, C	∞	∞
FC	9, C	∞	*	∞	3, C
FCE	9, C	9, C		9, C	*
FCEA	*	9, C		9, C	
FCEAB		*		9, C	
FCEABD				*	

Question 3

After the 3rd collision, the algorithm will chose between 2^3 different delay times. Each of the 8 options have equal probability of being chosen as the distribution is uniform. This means 153.6 µs will have a 0.125 probablity of being chosen.

Question 4

There needs to be a minimum frame size so that the sender can detect collision if there is one. If the frame size is too short then the collision would be detected after the transmission has already been completed. This relates to acknoledgment because if no collision is detected during transmission, the transmitter can know if the transmission successfully reached the destination.

Question 5

ALOHA is best when the carrier delay is large. This is because CSMA/CD will require a minimum frame-size proportional to the carrier delay. Making the minimum frame size too large will make the probality of collision extremely high and cause deadlock in the network.

CSMA/CD should be chosen when the carrier delay is relatively low. This will allow for reliable short transmitions across the network. Carrier delay should be below the packet transmission delay to keep line mostly free of collisions.