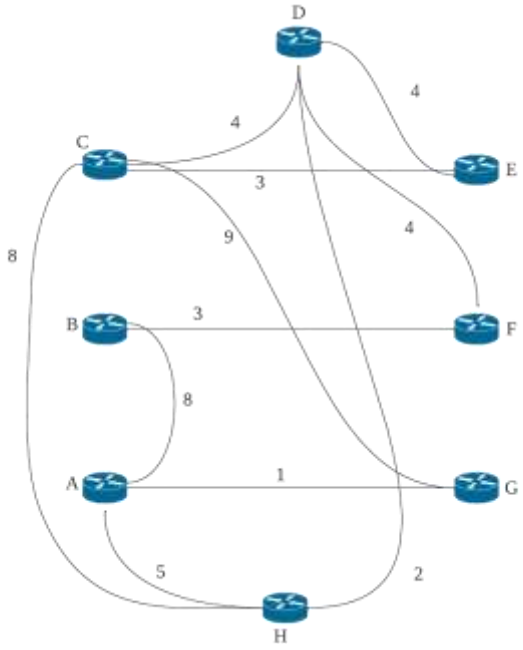
Homework 4

Question 1

A)



B)

N'	D(A), p(A)	D(B), p(B)	D(C), p(C)	D(D), p(D)	D(E), p(E)	D(F), p(F)	D(G), p(G)	D(H), p(H)
C	**∞**	**∞**	**-**	**4, C**	**3, C**	**∞**	**9, C**	**8, C**
CE	**∞**	**∞**	**-**			**∞**		**8, C**
CED	**∞**	**∞**	**-**			**8, D**		**6, D**
CEDH	**11, H**	**∞**	**-**					
CEDHF	**11, H**	**11, F**	**-**					
CEDHFG	**10, G**		**-**					
CEDHFGA								
CEDHFGAB								

C)

Destination	Next Hop	Shortest path cost
A	**G**	**10**
B	**D**	**11**
C	**C**	**0**
D	**D**	**4**
E	**E**	**3**
F	**D**	**8**
G	**G**	**9**
H	**D**	**6**

Question 2

A)

P	*Cost to*			
from		**P**	**Q**	**R**
	P	0	1	3
	Q	∞	∞	∞
	R	∞	∞	∞

Q	*Cost to*			
from		**P**	**Q**	**R**
	P	∞	∞	∞
	Q	1	0	2
	R	∞	∞	∞

R	*Cost to*			
from		**P**	**Q**	**R**
	P	∞	∞	∞
	Q	∞	∞	∞
	R	3	2	0

B)

Node P Table

P	*Cost to*			
from		**P**	**Q**	**R**
	P	0	1	3
	Q	∞	∞	∞
	R	∞	∞	∞

P	Cost to		
from	**P**	**Q**	**R**
P	0	1	3
Q	1	0	2
R	3	2	0

P	Cost to		
from	**P**	**Q**	**R**
P	0	1	3
Q	1	0	2
R	3	2	0

Node Q Table

Q	Cost to		
from	**P**	**Q**	**R**
P	**∞**	**∞**	**∞**
Q	1	0	2
R	**∞**	**∞**	**∞**

Q	Cost to		
from	**P**	**Q**	**R**
P	0	1	3
Q	1	0	2
R	3	2	0

Q	Cost to		
from	**P**	**Q**	**R**
P	0	1	3
Q	1	0	2
R	3	2	0

Node R Table

R	*Cost to*			
from		**P**	**Q**	**R**
	P	∞	∞	∞
	Q	∞	∞	∞
	R	3	2	0

R	*Cost to*			
from		**P**	**Q**	**R**
	P	0	1	3
	Q	1	0	2
	R	3	2	0

R	*Cost to*			
from		**P**	**Q**	**R**
	P	0	1	3
	Q	1	0	2
	R	3	2	0

Question 3

A)

Router 3c learns the prefix of x from eBGP

B)

Router 3a leans the prefix of x from iBGP

C)

Router 1c learns the prefix of x from eBGP

D)

Router 1d learns the prefix of x from iBGP.

Question 4

A)

We can find the optimal value of p by derivation the expression and setting it equal to 0. Because we have 2 unknown variables N and p we can see N as a constant instead of a variable when performing derivation.

$$\frac{\partial}{\partial p} Np(1-p)^{N-1} = N((1-p)^{N-1} - (N-1)p(1-p)^{N-2})$$

We then set it equal to 0

$$N((1-p)^{N-1} - (N-1)p(1-p)^{N-2}) = 0$$

B)

I couldn't find the maximum value of p. But if we leave out p the expression would be:

$$\lim_{N\to\infty} Np(1-p)^{N-1}, where\ p\ is\ the\ optimal\ value\ based\ on\ N.$$

C)

This means that pure ALOHA will have a maximum efficiency of:

$$\lim_{N\to\infty} Np(1-p)^{N-1} = \frac{1}{2e}, where\ p\ is\ the\ optimal\ value\ based\ on\ N$$

Question 5

A)

```
11000111010000
1010
----------------------
 1100
 1010
 ----------------------
  1101
  1010
  ----------------------
   1111
   1010
   ----------------------
    1011
    1010
    ----------------------
     0010
     0000
     ----------------------
      0101
```

```
0000
----------------------
  1010
  1010
  ----------------------
    0000
    0000
    ----------------------
      0000
      0000
      ----------------------
        0000
        0000
        ----------------------
          000
```

Answer: R=000

B)

```
01101010101000
0000
----------------------
  1101
  1010
  ----------------------
    1110
    1010
    ----------------------
      1001
      1010
      ----------------------
        0110
        0000
        ----------------------
          11010
          1010
          ----------------------
            1110
            1010
            ----------------------
              1001
              1010
              ----------------------
                0110
                0000
                ----------------------
                  1100
                  1010
                  ----------------------
                    1100
                    1010
                    ----------------------
                      110
```

Answer: R=110

C)

```
11111011111000
1010
----------------------
  1011
  1010
  ----------------------
    0010
    0000
    ----------------------
      0101
      0000
      ----------------------
```

```
      1011
      1010
      ----------------------
       0011
       0000
       ----------------------
       0111
       0000
       ----------------------
        1111
        1010
        ----------------------
         1010
         1010
         ----------------------
          0000
          0000
          ----------------------
           0000
           0000
           ----------------------
            000
```

Answer: R=000

D)

```
10001110001000
1010
----------------------
 01011
 0000
 ----------------------
   1011
   1010
   ----------------------
    0011
    0000
    ----------------------
     0110
     0000
     ----------------------
      1100
      1010
      ----------------------
       1100
       1010
       ----------------------
        1101
        1010
        ----------------------
         1110
         1010
         ----------------------
          1000
          1010
          ----------------------
           0100
           0000
           ----------------------
            100
```

Answer: R=100

Question 6

A)

Path	Source MAC	Destination MAC	Source IP	Destination IP
From A to C	A0-43-5B-CC-06-7D	EE-F3-56-FC-26-12	192.168.10.8	192.168.10.12
From C to B	42-73-BB-0A-06-87	13-05-32-EF-DD-02	192.168.10.8	192.168.10.12

B)

Yes, it will. This is because the switches tables are initially empty which means that it has no information where Host B is located. This means that it will forward the broadcast packet to find out more information on the network. Meaning that it will flood all ports beside the incoming port with the ARP packet. Doing this host E will receive the ARP query packet that initially was sent from host A.

C)

MAC Address	Interface
A0-43-5B-CC-06-7D	1
13-05-32-EF-DD-02	2

D)

Yes. This is because in the given scenario host E doesn't not know the MAC address of host B and therefore needs to send out an ARP query. But because switch C knows which interface leads to the correct MAC address it will not forward the ARP query packet to interface 1. Meaning that host A will not receive the ARP query packet.

E)

MAC Address	Interface
A0-43-5B-CC-06-7D	1
13-05-32-EF-DD-02	2
7D-51-12-F3-EE-06	3