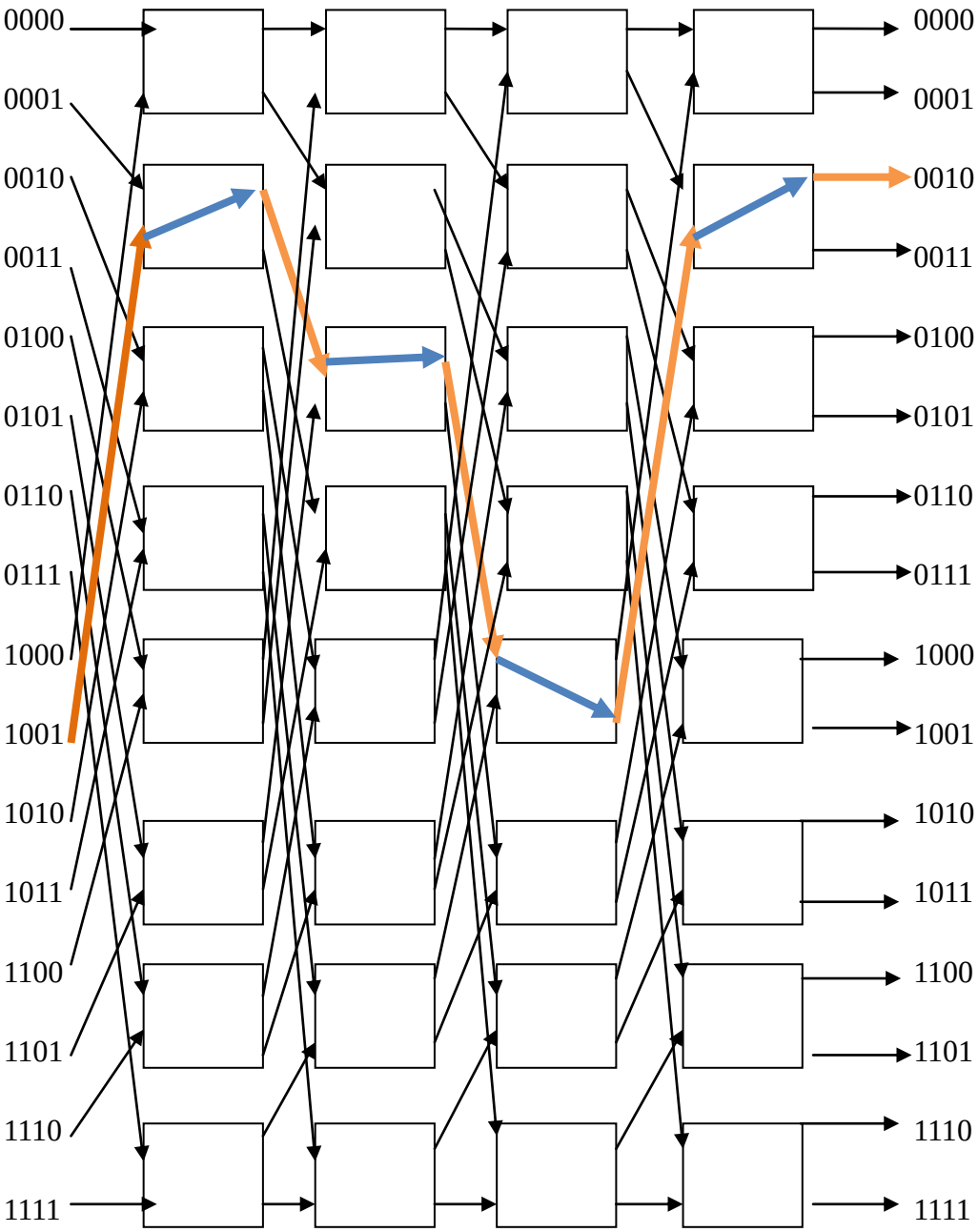
Q1.(a)


0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111

Q1.(b)

P9-M2

P9:1001 **M2:**0010

Route(four 1-bit comparisons)

Step1:

Mismatch(1/0): cross over

Step2:

Match(0/0): pass through

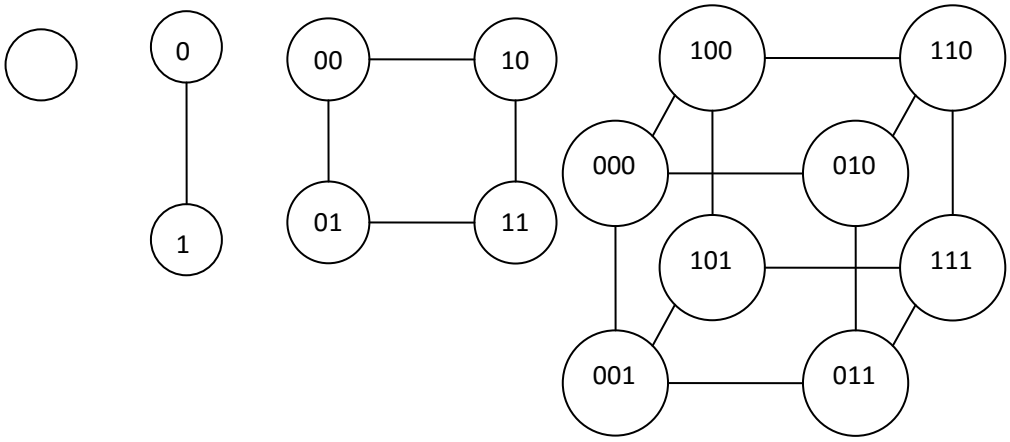
Step3:

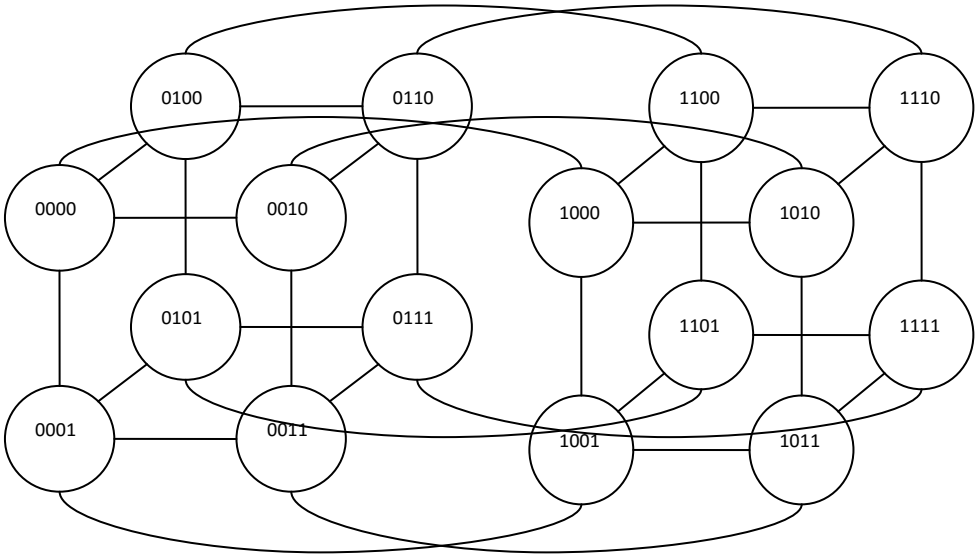
Mismatch(0/1): cross over

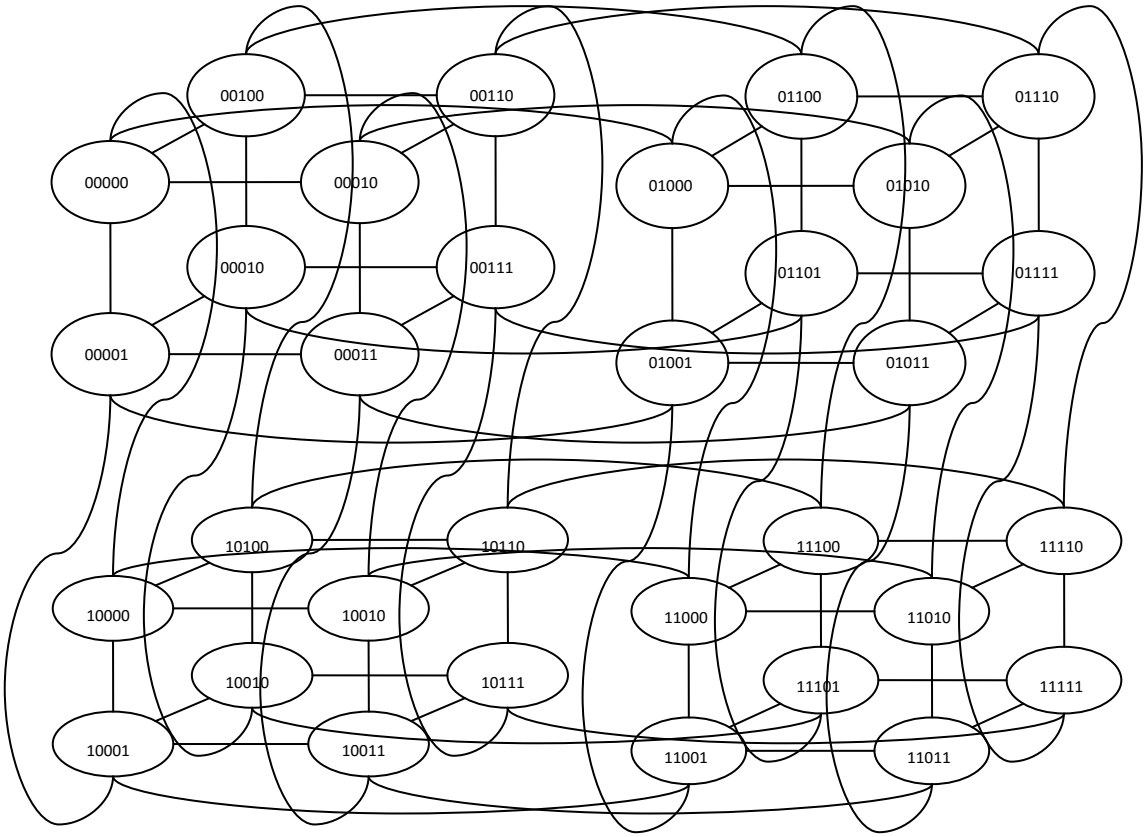
Step4:

Mismatch(1/0): cross over

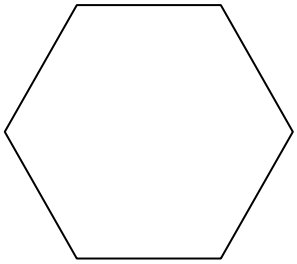
Q2.



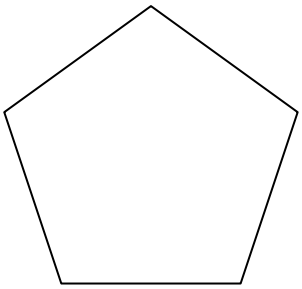

0100
0110
1100
1110
0000
0010
1000
1010
0101
0111
1101
1111
0001
0011
1001
1011


00100
00110
01100
01110
00000
00010
01000
01010
00010
00111
01101
01111
00001
00011
01001
01011
10100
10110
11100
11110
10000
10010
11000
11010
10010
10111
11101
11111
10001
10011
11001
11011

Q3.



(a)



(b)

P node Ring network

Diameter: In (a), p=6, the diameter is 3. In (b), p=5, the diameter is 2. Therefore, the diameter is $\left\lfloor \frac{P}{2} \right\rfloor$.

Bisection width: In (a), bisection width is 2. In (b), bisection width is also 2. So the bisection width is 2.

Connectivity: Each node only have 2 links to other nodes, so they are the "cheapest " to cut.

cost: The number of links in the ring network, so it is P.

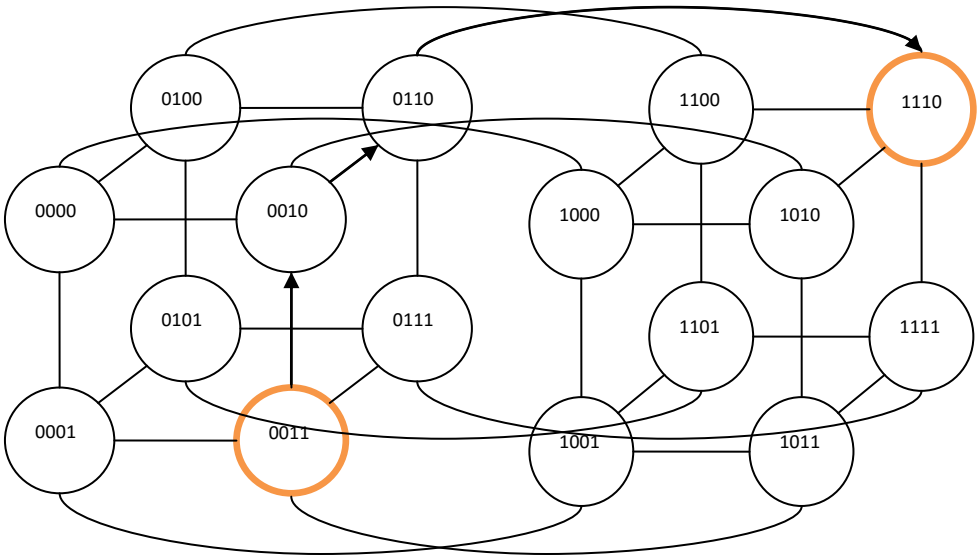
Q4

8 dimension hypercube

P=256

connectivity =log(p)
=log(256)
=8

Q5.(a)



P3-P14
P3: 0011
P14:1110
Step1:
0011 XOR 1110 = 1101 (1-bit)
We move along the z-axis towards 0010
Step2:
0010 XOR 1110 = 1100 (1-bit)
We move along the y-axis towards 0110
Step3:
0110 XOR 1110 = 1000 (1-bit)
We move along the z-axis towards 1110

Q5.(b)
1KB=1024byte=8192bits
a word=32bits, so there are 8192/32=256 words
the total communication time=8ms+256*6ms+3*2ms=1550ms=1.55s