1. 举出 ipv6 的两个变化并说明为什么做了这个改变
2. Checksum in UDP datagram in sender with port 1025 and in receiver with port 1026
   a) The last two bit in the datagram with port 1025 flipped, detect the corruption?
   b) The last bit in the datagram with port 1025 and in the datagram with port 1026 flipped, detect the corruption?
3. Ping photo. 4 packets, 1 packet = 32bytes, RTT = 144ms. No processing delay. Bandwidth = 10 Mbps. Distance from sender to receiver is d = 2000km. Speed = 2x10^8 m/s. The percentage of queue delay in RTT??

RTT $= 2(L/S + D/R + Dqueue)$

$= 4L/S + 4D/R + Q$ (Q is queue delay)

$4L/S = 4*32*8/10*10^6 = 0.0001024s$

$4D/R = 4*1000*1000/2*10^8 = 0.02$

$0.144 = 0.0001024 + 0.02 + Q$

$-> (Q/0.144) * 100\% = 86.04\%$

4. DNS
   a) 图表题，类似于 tut1 的练习题问你会有多少个 dns 查询
   b) 2 disadvantages for using Google public DNS as your local name server
5. 堵塞控制

TCP Reno
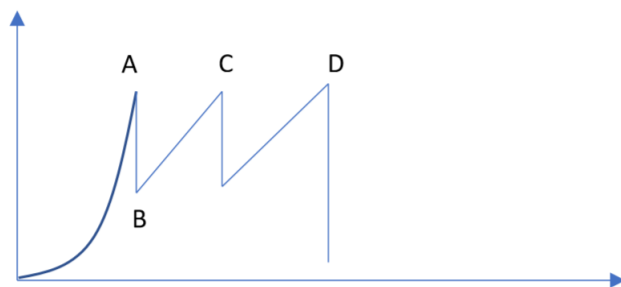
   a) Name the event in 3 points, A, C and D

      A: 3 dup packets

      C: 3 dup packets

      D: timeout

   b) Given the MSS = 1000 bytes. The connection set up is initial to 0. The connection set up takes 1 RTT. At point A, the sender has sent 31,000 bytes and the time is 3 second. What is the time for 1 RTT

RTT	EVENT	BYTES
1	Connection set up	0
2	Send 1 packets	1, 000
3	Send 2 packets	3, 000
4	Send 4 packets	7, 000
5	Send 8 packets	15, 000
6	Send 16 packets	31, 000

The total RTT is 6. Thus, 6 * time for one RTT = 3 sec. The time for 1 RTT is 0.5 sec.

c) From B to C is taking 2 sec. What is the last bytes has it sent?

d) In point D, the sender window size is 16,000 bytes and then down to 1,000 bytes. How long will it take the sender window size to 16,000 bytes. (in RTT or in sec)

6. MTU

IP header = 20.

A -> B: MTU = 1,500

B -> C: MTU = 1,000

C -> D: MTU = 500

D -> E: MTU = 1,500

a) Send a 1500 bytes packet from A to B and then from B to C, how the fragment looks like when it from B to C?

1000 – 20 = 980. But 1480 cannot divide by 8 nicely (1480 / 8 = 122.5). Then use 976 / 8 = 122. The length of first segment is 976 + 20 = 996
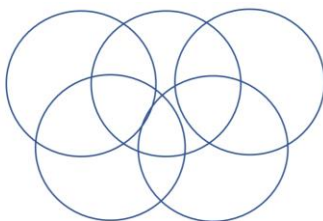
Length (with header)	More fragment(MF) flag	Offset
996	YES	0

The second is the rest of the packet. 1500 – 976 + 20 = 544.

Length (with header)	More fragment(MF) flag	Offset
544	NO	122

b) When the packet is sending from C to D and from D to E

7. MAC – slot/802.11

8. ARP+DHCP+DNS+HTTP

9. N person, 2 of them could communicate with each other and the others cannot know the chat. How many key needed?