City University of Hong Kong
Department of Electronic Engineering

EE3009 Data Communications and Networking

Solution to Tutorial 3

1. 128.56.24.0/24 = 10000000.00111000.00011000.00000000
   128.56.25.0/24 = 10000000.00111000.00011001.00000000
   128.56.26.0/24 = 10000000.00111000.00011010.00000000
   128.56.27.0/24 = 10000000.00111000.00011011.00000000
   Mask = 11111111.11111111.11111100.00000000
   The resulting prefix is 128.56.24.0/22

2. a.

Prefix Match	Link Interface
11100000 00000000	0
11100000 00000001	1
1110000	2
11100010	3
otherwise	3

   b.
   Prefix match for first address is 5th entry: link interface 3
   Prefix match for second address is 1st entry: link interface 0
   Prefix match for third address is 3rd entry: link interface 2

3. Given:
   IP packet = 600 data bytes
   MTU = 200 bytes
   IP header = 20 header bytes
   Maximum possible data length per fragment = MTU – IP header = 200 – 20 = 180 bytes.
   The data length of each fragment must be a multiple of eight bytes; therefore the maximum number of data bytes that can be carried per fragment is 22*8=176.

   The data packet must be divided into 4 frames, as shown by the following calculations:
   176 + 176 + 176 + 72 = 600
   20 + 20 + 20 + 20
   196 196 196 92

The sequence of frames and packet headers is shown below:

	Total length	Id	Mf	Fragment Offset
Original Packet	620	x	0	0
Fragment 1	196	x	1	0
Fragment 2	196	x	1	22
Fragment 3	196	x	1	44
Fragment 4	92	x	0	66

4.

a. ::F53:6382:AB00:67DB:BB27:7332

b. ::4D:ABCD

c. ::AF36:7328:0:87AA:398

d. 2819:AF::35:CB2:B271

5. Typically the wireless router includes a DHCP server. DHCP is used to assign IP addresses to the 5 PCs and to the router interface. Yes, the wireless router also uses NAT as it obtains only one IP address from the ISP.