Homework 6 Solutions

Problem 1:

(a) Since 47 in binary is 00101111, the first bit of the leading byte is 0, so this is a class A address.
(b) The network mask consists of the first 23 bits of the IP address written in binary: **00101111.10010111.1001100**0.00000000. The first address in the network range is **00101111.10010111.1001100**0.00000000, i.e. 47.151.152.0 and the last address is **00101111.10010111.1001100**1.11111111, i.e. 47.151.153.255. The first address is often the network address and the last address is usually the broadcast address for the network.
(c) There are $2^{(32-23)} = 2^9 = 512$ addresses, of which traditionally all but two are addresses of hosts.

Problem 2:

In hex and binary, the IP address 138.19.55.135 is 0x8a.0x13.0x37.0x87 = 10001010.00000001.00110111.10000111.

136.0.0.0/5 is mask **1000 1**000.** which matches.
138.0.0.0/8 is mask **1000 1000**.** which also matches
138.19.54.0/23 is mask **10001010.00000001.0011011***.******** which also matches
138.19.56.0/23 is mask **10001010.00000001.0011100***.********, which does not match.
138.19.48.0.20 is mask 1**0001010.00000001.0011****.********, which also matches.

According to the rule, we select the longest mask, i.e. 138.19.54.0/23 that matches. Therefore, this packet is routed to Interface 2.