

Computer Networks – Final – Spring 2023

Submit a pdf with answers for questions 1 through 4. For question 5, attach your source code as a .java or .py file. No other attachments will be graded.

Do your own work. Plagiarism will be reported.

For each of the questions (1) to (4) below, give a **very brief** reasoning for your answers.

1. (10)The following is an IP datagram (no Ethernet header included) carrying an ICMP message message . The following questions apply to this datagram.

```
45c0 0042 1215 0000 4001 4489 898c 0869
898c 07dc 0303 207e 0000 0000 4500 0026
5be4 0000 0111 3a86 898c 07dc 898c 0869
8086 82a0 0012 5543 0602 6c99 bf41 4825
0a00
```

(a) What is the port number of the application that originated the datagram or segment that resulted in the ICMP message?

(b) What is the ICMP message telling the receiver of the message?

(c) What transport protocol PDU resulted in the ICMP message (UDP/TCP)?

(d) Who (give IP) sent the original datagram that caused this ICMP message to be generated?

(e) What is the port number the original datagram (that caused the ICMP message) was destined to?

2. (4) Suppose a network 202.107.64.0/20 is sub-netted with a 21-bit netmask. What is the broadcast addresses that the resulting two sub-nets can have?

3. (4) The broadcast address of a local network with netmask 255.255.255.224 is 137.140.91.127. What is its network address?

4. (4) For a particular datagram, if the IP header length field is 0x0b and the total length field is 0x3d0f, what is the amount of transport layer data that the datagram is encapsulating?

5. (18) Write a UDP server that accepts a string from a client, and sends back the count of the number of integers and the number of non-integer words in the string. The returned values are sent to the client as a string consisting of the two integer values separated by a space. The first of these is the count of integers in the supplied string, and the second is the count of non-integer words. For example, if the client sends the string "sum of 123 and 32 is 155" the server returns the string "3 4", since the string has 3 integers and 4 non-integer words. The UDP port number to be used by the server should be given as command line parameter.