Networks and Distributed Systems	**Homework 3: IP**
CS3700 Fall 2016	**September 12, 2016**

This homework is due at the beginning of class on October 5, 2016 and is worth 1.5% of your grade.

Name: _____

CCIS Username: _____

Problem	**Possible**	**Score**
1	15	
2	20	
3	5	
4	15	
5	10	
Total	65	

1a. For the following IP addresses, give their class (A, B, or C) and their representation in binary: 129.10.115.10, 4.3.2.129, 220.33.9.21. (5 pts)

1b. The binary representation of 128.42.5.4 is shown below.

10000000 00101010 00000101 00000100

If the subnet mask is 255.255.248.0, label the bits that correspond to the (a) class prefix, (b) the network number, (c) the subnet number, and (d) the host number. (10 pts)

2a. Convert the following IP/subnet representations of networks to the equivalent CIDR representation. If the network cannot be represented in CIDR, briefly explain why.

(i) 128.42.0.0/255.255.0.0

(ii) 192.168.0.0/255.255.224.0

(iii) 172.10.12.0/255.255.253.0

(iv) 64.0.0.0/192.0.0.0 (10 pts)

2b. Suppose that you have been allocated 173.98.112.0/20, and you wish to divide your address space equally into four parts. What are the CIDR (Classless Interdomain Routing) representations of these four parts? (10 pts)

3. Why does the Offset field in the IP header measure the offset in 8-byte units? (Hint: Recall that the Offset field is 13 bits long.) (5 pts)

4. Suppose you receive the following series of IP packets at a destination host (be sure to remember that the length field in the packet *includes the header*, and the offset is specified as the number of 8-byte blocks from the beginning of the data in the original IP datagram):

#	ID	Flags	Offset	Total Length
1	0xdb7a	-	370	300
2	0x7823	MF	370	1500
3	0x992a	MF	185	300
4	0x45a9	-	0	1500
5	0x7823	MF	0	1500
6	0x992a	MF	0	1500
7	0xdb7a	MF	185	1500
8	0x9ffb	-	200	1500
9	0xdb7a	MF	0	1500
10	0x33aa	-	0	1500

What packet IDs have you completely received, and how many total data bytes are in each of the completely received packets? For this problem, you can assume that all IP packets have no options. (15 pts)

5. You are a router, and one of your outgoing links has an MTU of 1000 bytes (ignore layer 2 headers). You receive the following packets that all need to be sent out over this link:

#	ID	Flags	Offset	Total Length
0	0x1930	-	0	1000
1	0x92ad	-	0	3000
2	0x944f	DF	0	1000
3	0xaa22	-	185	1001
4	0x78a1	MF	370	1500
5	0x3ac8	DF	0	1500

Fill in the table below with the header fields of the packets that you send out (you may not need all of the rows). The first packet has been completed for you. (10 pts)

#	ID	Flags	Offset	Total Length
1	0x1930	-	0	1000
2				
3				
4				
5				
6				
7				
8				
9				
10				