INS: Tutorial 2

Question 1

Given an IPv4 datagram with no header options and 2000 bytes of payload, travelling from network A to D, and networks with the following MTUs:

- Network A: 3000 bytes
- Network B: 704 bytes
- Network C: 1500 bytes
- Network D: 3000 bytes

1. Travelling via network B, there will be 3 fragments with whole sizes (in bytes) of 700, 700 and 660, payload sizes (in bytes) of 680, 680 and 640, and fragment offsets (in multiples of 8 bytes) of 0, 85 and 170.
2. Travelling via network C, there will be 2 fragments with whole sizes (in bytes) of 1500 and 540, payload sizes (in bytes) of 1480 and 520, and fragment offsets (in multiples of 8 bytes) of 0 and 185.
3. Travelling via C then B, the message will be split into two fragments at C. When passing through B, the first original fragment will be split into three more; the second original fragment will not need to be split. D will receive 4 fragments in total.
4. Travelling via B then C, the message will be split into three fragments at B. Each of these will travel through B without fragmentation. D will receive 3 fragments in total.

Question 2

One's-C sum of other words:	`....1100 1010 0101 1001`
First word:	`+...0100 0101 1000 0000`
Sum result:	`= 1 0000 1111 1101 1001`
One's-C 'swing around':	`+.....................1`
One's-C sum:	`....0000 1111 1101 1010`
One's-C:	`....1111 0000 0010 0101`

The checksum is used to verify the integrity of the header by summing it all as 16-bit words, including the header - if the result is zero, then the header was almost certainly not corrupted. If any bits in the header were flipped, this sum will almost certainly *not* be zero.