1 NAT

(1) **True/False**

    i. NAT allows multiple hosts to share the same IP address in a way that conforms to the E2E principle.

    ii. Port numbers are used to multiplex among hosts behind the same NAT.

(2) **Short Answer**

Consider a host A behind a NAT, trying to communicate with a remote host B. When a packet headed for B leaves host A, its source port is 1, destination port is 2, source IP is 1.2.3.4, destination IP is 4.3.2.1. When a packet headed for A leaves host B, its source port is 2, destination port is 3, source IP is 4.3.2.1, destination IP is 5.6.7.8. Based on the information above, answer the following questions:

    i. The packet from host A to host B arrives at the NAT. What are the fields in the packet after the NAT has altered it?

        Source IP: _____

        Source Port: _____

        Destination IP: _____

        Destination Port: _____

    ii. The packet from host B to host A arrives at the NAT. What are the fields in the packet after the NAT has altered it?

        Source IP: _____

        Source Port: _____

        Destination IP: _____

        Destination Port: _____

2 Midterm Potpourri

(1) **Short Answer**

  (a) In Link State routing, routers always know the path along which their packets will travel.

  (b) Consider a routing protocol that always computes valid paths, where the forwarding decision at router X can depend on (i) the destination address and (ii) the interface through which the packet arrived at router X. Assume that the routing algorithm has converged, and consider the routing entries that take a packet from Host A to Host B. Which of these statements are true? (Mark all that apply.)

  (c) A router splits a 3240 byte packet (which uses no IP options) into four fragments before sending it out over a link that has an MTU of 1000 bytes. There is no error in the fragmentation process, but the implementation chooses to break up the packet into fragments with different sizes. We will tell you the fragment sizes, but not the order in which they are sent. The fragment sizes are, from smallest to largest: 620, 800, 900, and 980 bytes. In the following, you can decide if this is enough information to answer certain question. Which of these fragments (identified by their size), does not have the MF flag set (i.e., which is the fragment containing the last byte of the original packet)?

(2) **Reliability** Consider a design that uses cumulative ACKs (where an ACK of the fifth packet means all five lowest packets have been received, but not the sixth). Whenever a packet is sent, a timer is set for it, and if not ACKed when the timer goes off, the packet is resent. The algorithm starts by sending the last five packets (i.e., the highest numbered), and then sends an additional packet (the highest-numbered previously unsent packet), whenever one of its previously sent packets is ACKed for the first time. Is this reliable?