1. What are the differences between multiplexing done in a UDP socket vs a TCP socket? What would happen if we were to use the same IP and Port number for transferring data to different clients in our implementation of UDP Putah? (3 points)

TCP handles multiplexing by combining two or more data streams into a single connection, UDP does not. If we were to use the same IP and Port number for transferring data to different clients we wouldn't be able to open the connections at the same time. The socket for the first client would lock the port it's receiving data on, and the second client would not be able to utilize that port.

2. Why does TCP require three messages to establish the connection? What would go wrong if you were to attempt building the connection with two messages? (3 points)

The first message is to ask for permission to begin the exchange using the port the server is listening on for this type of message, the next two messages exchange the ports to use for the connection. If the first message is skipped the connection would be refused because the server is waiting on the first type of message on a specific port the client should already know. The second message is the only message the server sends during this handshake, without it the client would not receive the new port for the connection. The third message is the acknowledgment from the client, telling the server it's ready to begin with it's new connection port.

3. Explain how you implemented the sharing of connection socket port numbers between the client and the server in your implementation. Justify your choice of header and message content in sharing this information. (4 points)

During the handshake the message content is 0 bits for all 3 handshake messages. Only a header is actually sent. The client makes contact with the server sending the port the client is currently listening for an ACK on. This is necessary to receive that ACK containing the servers new connection port. Once the servers sends its ACK with it's new port, the client responds with it's new port to receive on and they can begin transferring data with the new connections.