(a) What are the advantages and disadvantages of the client/server and peer to peer multiplayer game architectures?

**Answer:**

**Client:**

**Efficiency and reliability depend on server.**

**Popular data = more congestion = slower.**

**Centralized data repository: easier to maintain, more accountability, better security.**

**Server can control and record transactions by clients.**

**One server can work with a wider variety of client capabilities.**

**Server must be easy to find: Hence well- known port numbers.**

**P2P:**

**Decentralized & more robust. No single point of failure.**

**Popular data = more distribution = faster.**

**Decentralized data: more redundancy, harder to maintain, less accountability, less security.**

**Transactions are not recorded, harder to trace.**

**Peers need to be fairly compatible.**

**Peers need to find each other.**

(b) In the peer-to-peer network architecture with authoritative host, how the peers communicate with each other? Draw diagrams to aid your explanation if appropriate

**Answer:**

**One client connects to the host, and begins transferring data back and forth**. **When another client joins,** **they do the same.** **The host then provides the clients information** **about** **the other,** **allowing the peers to communicate with each other through the host.**

(c) In the context of "port restricted" NAT devices, what does the hole-punching technique do? Describe this technique, using a diagram to aid your explanation if appropriate.

**Answer: Hole punching is a technique for establishing a direct connection between two parties in which one or both are behind NAT devices, without the collaboration of the NAT itself.**