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

In the context of IP-restricted NAT (Network Address Translation) devices, the punch is used to directly communicate between two devices behind different NAT devices; This is not allowed to be restricted because the IP address is translated by NAT and firewall function. The
Punch works using the behaviour of the NAT device when it is running and entering the network. Generally, NAT devices manage the IP address and port (IP address) of the internal device and the external IP address and port (public IP address) provided by the NAT device. Here are the steps you would take: Initial Connection, Outgoing Communication, Connection Request, Server Assistance, Outgoing Communication from Device B, Connection Reply, Hole Punching, NAT Traversal, Direct Communication

2. In multiplayer online games, interest management cuts down the bandwidth usage by filtering irrelevant updates. Describe two common techniques of interest management.

1. Spatial Partitioning: Spatial partitioning divides the game world into distinct regions or areas. Each player is assigned to a specific region based on their position in the game world. The game server then sends updates only to the players who are within the same region or nearby regions.
2. Interest Management via Entity-Component-System (ECS): The Entity-Component-System architecture is a popular approach for game development. In this architecture, the game world is composed of entities, which are combinations of components that define their behavior and attributes. ECS Management

3.Interest management is important for good network performance in massively multiplayer games. What is a potentially visible set, and how does this approach differ from static zones? How do these interest management approaches benefit the game?

In the context of interest management in massively multiplayer games, a "potentially visible set" (PVS) refers to the set of objects or entities that could potentially be seen by a player from their current viewpoint. It represents the dynamic visibility information based on the player's position, orientation, and other factors.

Here's a comparison of PVS approach and static zones in interest management:
Potentially Visible Set (PVS):
Dynamic Visibility:
Real-Time Updates

Static Zones:
Predefined Regions
Fixed Visibility
Simplified Management

Benefits of the PVS approach and dynamic interest management include:
Reduced Bandwidth Usage
Improved Network Performance
Scalability

4. Describe one example for client-side attack and server-side attack, respectively. Please include details of how this attack works and a mechanism to prevent it.

An example of a client-side attack would be phishing. Phishing involves social engineering and on hacking at all. Typically, an attacker pretends to be someone they are not to get the necessary information from someone. They will typically send an email with a link which leads to a website which might look like the real deal but is not the same. This is used on unsuspecting users who don't know any better. Rule 1 is don't click unknown links for this reason.

SQL Injection is a server-side attack where an attacker inserts malicious SQL code into a web application's database query. This can occur when a web application fails to properly validate or sanitize user input that is concatenated directly into SQL queries, allowing an attacker to manipulate the database or gain unauthorized access to sensitive information.

5. Cheating in online games is the action of pretending to comply with the rules of the game, while secretly subverting them to gain an unfair advantage over an opponent. Describe two ways of cheating. Please include details of how each cheating works and a mechanism to prevent it.

Aim bot / Auto aim allows users to not have to worry about the difficulty of shooting. Using an aim-bot makes the users aimer go directly to nearby players, often even if there is a wall in between. This makes it typically blatant, obvious, and easy to spot when being looked at by a seasoned player.

Wall hacks allows users to see where enemies are through walls so they can pre fire or get ready for where they are coming from. This works and looks like X-ray vision. The reason this is so bad as it gives those players an unfair advantage. When you then come around the corner it is now humanely impossible to react fast enough.