Please answer each question with a written response (no code required). Feel free to use whatever software you want for your write-up. However, you should convert it to a `pdf` file for your submission upload.

Question 1: P2P File Transfer Rate

One of the potential benefits of a peer-to-peer (P2P) network is decreased transfer time due to more peers sharing files. In a client-server architecture, the server is the only source that can transfer them. However, in a P2P architecture, each peer can share parts of a file (called chunks) to others while still downloading other parts (other chunks).

Assume that a peer began sharing a new file with 9 other peers in a P2P network as follows:

- The file being shared is 1MB.
- Each peer can send 1 chunk of size 1KB at a time.
- Each peer can transmit 1 chunk per second.
- To send a new chunk, a peer will randomly select another peer in the network that does not have the complete file.
  - To simplify the starting conditions: you can assume each peer has at least one chunk.
  - You can also assume that each peer will always be sending a useful chunk to someone.
- Assume no packet loss or delay.

How long would it take all 10 peers to have a complete version of the file?

Question 2: Packet Loss

`Host a` wants to transmit a single packet to `Host b` over a really lossy network environment via UDP. The probability the packet will be transmitted successfully is only 1% (meaning it has a 99% chance to be dropped). Additionally, `Host b` will never send a response informing `Host a` the packet was transmitted successful. How many times should `Host a` send the packet to `Host b` to give over a 99.9% chance of successful transmission?