Computer Communications and Networks (COMN)
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Assignment Part 1 Results Sheet

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Question 1 – Number of retransmissions and throughput with different retransmission timeout values with stop-and-wait protocol. For each value of retransmission timeout, run the experiments for **5 times** and write down **average number of retransmissions** and **average throughput**.

[redacted]	[redacted]	[redacted]
5	226.6	580.2
10	189.2	179
15	126.6	137.2
20	190.6	101.8
25	332.8	58.4
30	26.8	41.6
40	19	39.4
50	28.4	40.4
75	19.4	39.2
100	19.2	38.8

Question 2 – Discuss the impact of retransmission timeout value on number of retransmissions and throughput. Indicate the optimal timeout value from communication efficiency viewpoint (i.e., the timeout that minimizes the number of retransmissions and keeps the throughput as high as possible).

As seen in the average number of transmissions, there is an inverse correlation between the timeout value and the number of retransmissions. This is as expected, because a bigger timeout minimises the chances of premature packet resending. However, this timeout only needs to be slightly bigger than the round-trip time (of around 20 ms) for the retransmission numbers to drop dramatically. This drop was seen between using 25ms and 30 ms as the timeout. The difference of throughput when using 30ms and 100ms was not significant, if anything, there was a deterioration in throughput as the timeout value increased (as 100 ms is much greater than necessary for the trips happening in part 1.)

Based on my results, the optimal timeout value is 30ms, which is a typically expected value when considering return communication trips at 5ms each way.

The theoretical maximum throughput for the pipes used in 1b (with 20ms best case RTT and each packet containing 1027 bytes) can be calculated by: 1027/20 = 51.35 bytes/ms = 51.35kB/s, since the stop-and-wait protocol must wait for confirmation before sending the next packet.. As can be seen in my results from 5ms to 25ms as timeout values, the throughput is too large to be accurate, meaning an incorrect image was received. Despite creating the FSM for both sender and receiver classes to have states for 0 and 1 receivals and sendings, which should disallow any package loss or confusion, some packets were skipped when the timeout was less than 30ms, and so the image was not a perfect copy, even if close. I was unable to resolve this problem.