Question 1. Brief summary of Claude Shannon's 1948 paper.

Claude Shannon's paper begins with the idea that the problem of communication is merely reproducing a message at one point from another point. The messages’ meaning or lack of is irrelevant to engineering problem of communication. Shannon then states that systems allowing communication to occur generally consist of five essential parts. The information source that produces the message, the transmitter which transforms the message, the channel which carries the transformed message, the receiver which performs the inverse of the transformation done by the transmitter, and finally a destination where the message is delivered. Shannon goes on to further discuss about the communication system model starting with the channel, specifically what a channel’s maximum capacity is. Afterwards, he gives examples of information sources leading to showing that information sources can are Markov processes. Following the discussion of information sources, Shannon talks about the entropy or uncertainty that choice brings in an information source and how through considering the statistical structure of that information we can reduce the entropy. This reduction of entropy from a maximum entropy value given the same set of symbols is the redundancy in the information source. As a final topic, he briefly discusses the encoding and decoding of information to get the entropy of the source, before stating that it isn’t possible to communicate at an average rate greater than C/H (symbols per second) where C is the capacity of the channel (bits per second) and H is the entropy of the source (bits per symbol).