The information in continuous but bandlimited signals is quantised, in that such continuous signals can be completely represented by a finite set of discrete numbers. Explain this principle in each of the following four important contexts or theorems. Be as quantitative as possible:

(a) The Nyquist Sampling Theorem. [5 marks]

(b) Logan’s Theorem. [5 marks]

(c) Gabor Wavelet Logons and the Information Diagram. [5 marks]

(d) The Noisy Channel Coding Theorem (relation between channel bandwidth $W$, noise power spectral density $N_0$, signal power $P$ or signal-to-noise ratio $P/N_0W$, and channel capacity $C$ in bits/second). [5 marks]