## Part 3 – Three Properties - Questions

**In the next three questions you will prove that Shannon's entropy ($H(p_1, \dots, p_n) = -\sum_{i=1}^{n} p_i \log p_i$) has the three properties in the coming clips it will be proven it is the only function that has these properties. The solutions are in the following pages.**

### Question 1

Prove that shannon's entropy is continuous in $p_i$.

### Question 2

Prove that $H\left(\frac{1}{n}, \dots, \frac{1}{n}\right)$ is a monotonic increasing function of n.

### Question 3

Prove that If a choice be broken down into two successive choices, the original *H* should be the weighted sum of the individual values of *H*.