Lec 9/14

Friday, September 14, 2018 14:21

Ex: prove or disprove $FS(C) = [0, \infty)$ (Classical Cantor set.)

Ex: If $f: \{1, \dots, n\} \supset$, let $a_k^{(f)} = |\{f^k(1), \dots, f^k(n)\}|$. Show that

$$\left| \left\{ (a_n^{(f)})_{n=1}^{\infty} \;\middle|\; f: \{1, \dots, n\} \supset \right\} \right| = 1 + p(1) + p(2) + \cdots + p(n-1)$$

where $p(i)$ is the number of partitions of i.

For Monday: Read 6.1–6.4. Submit problems. 6.1.6(b), 6.3.(4,5,6,7), 6.4.1

Probability Buzz Words:

Laws of Large Numbers
Central Limit Theorem
The law of iterated logarithms.

} limit theorems

Random Walks: Probability 1 to come back in $\mathbb{Z}$ and $\mathbb{Z}^2$, but < 1 in $\mathbb{Z}^3$.

Benford's Law

Ex: Consider the sequence of first digits of 2^n: 1, 2, 4, 8, 1, 3, 6, ...
What appears more frequently: 7 or 8?

$$\{0,1\}^{\mathbb{N}} = \mathcal{P}(\mathbb{N}) = C = \text{2-colorings of } \mathbb{N} = \text{0-1 seq-ns} = \text{coin tossing}$$

(Cantor's set)

Ex: does pairwise independence imply joint independence?

$$P(A)P(B) + P(B)P(C) + P(C)P(A) - P(A \cap B \cap C)$$

$$1 = P(A) + P(B) + P(C) - P(A)P(B) - P(B)P(C) - P(C)P(A) +$$

Ex: $\mathbb{Q}[\sqrt[3]{2}]$ is a field.