COMP2711H Tutorial 6

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1 Memoryless Property

Geometric random variables are said to be memoryless because the probability that you will reach your first success n trials from now is independent of the number of failures you have experienced.

Lemma 1.1. For a geometric random variable X with parameter p and for $n > 0$,

$$Pr(X = n + k | X > k) = Pr(X = n)$$

Exercise 1.1. Use the memoryless property to derive the expected value of a geometric random variable X with parameter p.

Exercise 1.2. We roll a standard fair die over and over. What is the expected number of rolls until the first pair of consecutive sixes appears? (Hint: The answer is not 36.)

References

[1] M. Mitzenmacher and E. Upfal. *Probability and computing: Randomized algorithms and probabilistic analysis*, chapter 2. Cambridge University Press, 2005.