**Homework1**

**Ali Arous**

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| Note: for some strange reason with my windows operating system, I could not make a compressed file (.zip) containing the two files (.pdf and .ipynb). so I have uploaded the jupyter notebook on the following url: <https://ali-arous.github.io/db/homework1_aliarous.ipynb> |

**Exercise 1:**

Since we know that the number X1 of heads is a binomial r.v: *X1 ~ B(n, ½),*

**1)**

**a) Find the pmf of X2 conditional to a given value of X1**

**b) Find the joint pmf of (X1, X2)**

**c) Find the joint pmf of (X1, X2, R2)**

**d) Find the marginal pmf of X2 and the marginal pmf of R2**

**2)**

**The pmf of X3 conditional to given values of X1, X2:**

**The pmf of Xk conditional to given values of Xi where i = 1,…,k-1:**

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**The joint pmf of (X1, X2, X3):**

**The joint pmf of (X1, X2,…, Xk):**

**The joint pmf of (X1, X2,…, Xk,Rk):**

While  holds, otherwise pmf = 0.

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**The marginal pmf of X3 and the marginal pmf of R3**

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**The marginal pmf of Xk:**

**3) Define the r.v. Y = "Total number of tosses". Obtain the cdf of Y .**

Each coin toss is a Bernoulli experiment.

The total number of tosses (m) required to get (n) heads out of (n) coins is:

A random variable Y ~ Negative Binomial Distribution:

The cdf of Y is:

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