

Assignment6

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February 26, 2021

Problem statement: Find the probability distribution of number of success in two tosses of die, where success is defined as

- i number greater than 4
- ii six appear on at-least one die

X	Number of outcomes	P(X)
0	16	$\frac{16}{36} = \frac{4}{9}$
1	16	$\frac{16}{36} = \frac{4}{9}$
2	4	$\frac{4}{36} = \frac{1}{9}$

Table 2: Favourable outcomes

1 number greater than 4

Let X be the number of times the number greater than 4 occurs

When we throw 2 dies, there can be three cases

1. no number greater than 4
2. one number greater than 4
3. both number greater than 4

so values of **X** can be **0,1,2**

The sample space when 2 dies are thrown,

	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

Table 1: Sample space

X	0	1	2
P(X)	$\frac{4}{9}$	$\frac{4}{9}$	$\frac{1}{9}$

Table 3: probability distribution

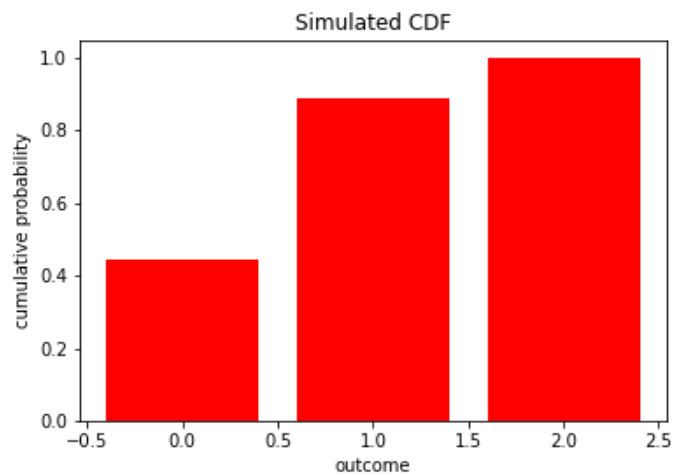


Figure 1: simulated CDF

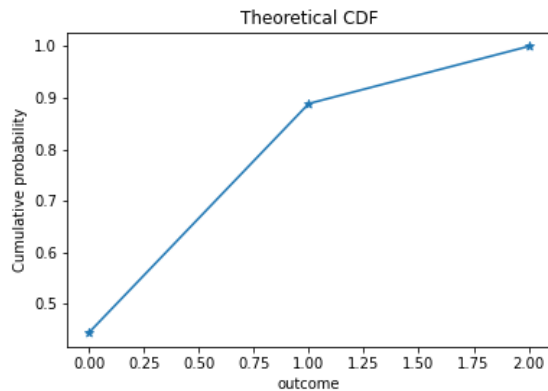


Figure 2: Theoretical CDF

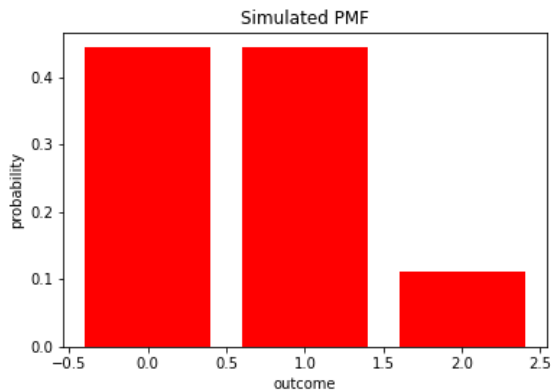


Figure 3: simulated PMF

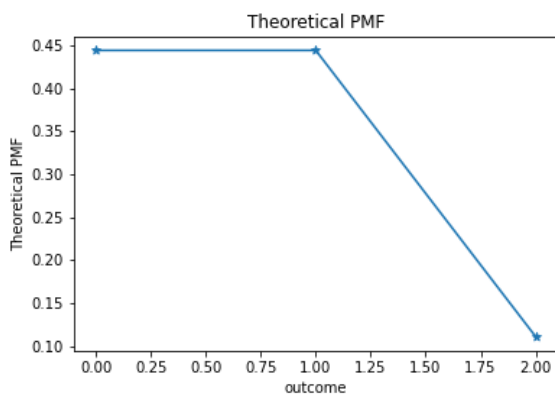


Figure 4: theoretical PMF

2 six appear on at-least one die

since a pair of dies are thrown,
There can be two cases

1. six does not appear at all
2. six appear on atleast one die

Hence,

$X=0$ six does not appears at all

$X=1$ appears on atleast die

Finding $P(X=1)$

ie,probability that at-least one head appears

	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

Table 4: Sample space

$$P(X=1)=\frac{11}{36}$$

Finding $P(X=0)$

ie,probability that six does-not appear

$P(X=0)$ = probability that six does-not appear

$$= 1 - P(X=1)$$

$$= 1 - \frac{11}{36}$$

$$= \frac{25}{36}$$

Therefore, $P(X=0)=\frac{25}{36}$ so,our probability distribution is

X	0	1
P(X)	$\frac{25}{36}$	$\frac{11}{36}$

Table 5: probability distribution

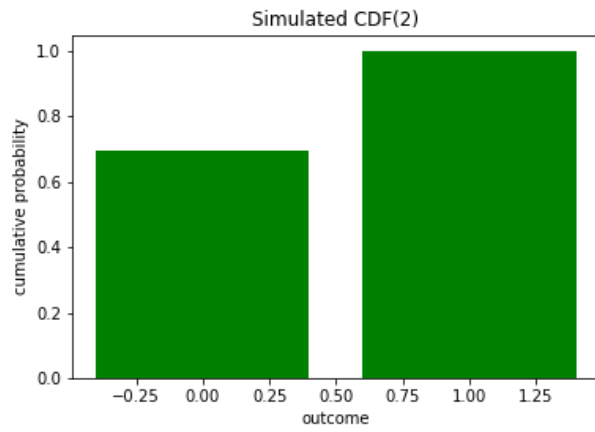


Figure 5: simulated CDF

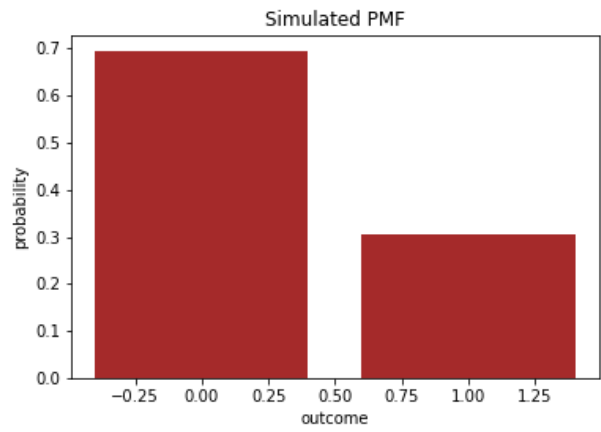


Figure 7: simulated PMF

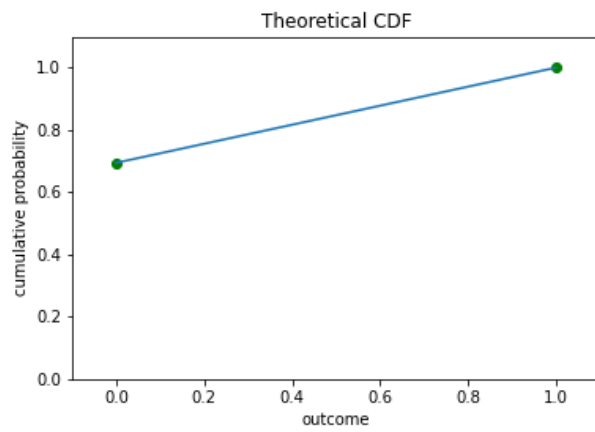


Figure 6: Theoretical CDF

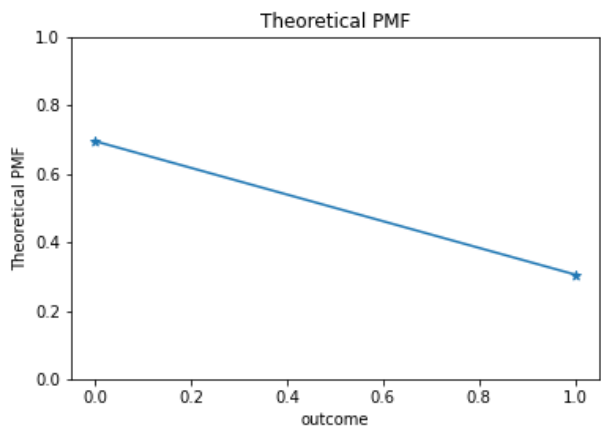


Figure 8: theoretical PMF