Assignment 5

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Python Code link:

1 Prob. 4.8:

A die is thrown 6 times. If getting an odd number is a success, what is the probability of

- (1). 5 successes?
- (2). at least 5 successes?
- (3) at most 5 successes?

Solution: let X is random variable of getting success or failure.

$$P(X=1) = \frac{3}{6} = \frac{1}{2} = p$$

 X_1 is a Bernoulli random variable

 $X \in \{0, 1\}$ $P(X_1 >= 5) = P(X_1 = 5) + P(X_1 = 6)$

(2) At least 5 success

0.100

0.095

0.090

0.085

0.080

0.075

$$= \binom{6}{5} \times \left(\frac{1}{2}\right)^5 \times \left(\frac{1}{2}\right)^{6-5} + \binom{6}{6} \times \left(\frac{1}{2}\right)^6 \times \left(\frac{1}{2}\right)^0$$

4.9925 4.9950 4.9975 5.0000 5.0025 5.0050 5.0075

X_1

experimental result

theortical result

A₁ is a Bernoulli random variabi

(1)

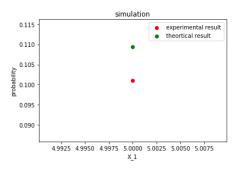
$$P(X_1 = 5) = {6 \choose 5} \times \left(\frac{1}{2}\right)^5 \times \left(1 - \frac{1}{2}\right)^{(6-5)} = 0.09375 + 1/64$$

$$=6\times\frac{1}{32}\times\frac{1}{2}$$

= 0.09375

$$= 0.09375 + 0.015625$$

$$= 0.109375$$



(3) At most 5 successes

$$P(X_1 \le 5) = 1 - P(X_1 \ge 6)$$

= $1 - {6 \choose 6} \times (\frac{1}{2})^6 \times (\frac{1}{6})^0$

$$= 1 - 0.015625$$

= 0.984375

