

# Solution to Exemplar - 12.13.3.19

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**Question:** Four cards are successively drawn without from a deck of 52 playing cards. What is the probability that all the four cards are kings?

**Solution:**

Let  $X$  be the random variable which denotes the number of kings which came up when four cards were drawn from a deck of 52 cards without replacement.

$$p_X(k) = \Pr(X = k) \quad (1)$$

$$= \frac{{}^4C_k}{{}^{52}C_4} \times {}^{48}C_{4-k} \quad (2)$$

So we have to find the probability when all the 4 cards drawn are king,

$$p_X(4) = \Pr(X = 4) \quad (3)$$

$$= \frac{{}^4C_4}{{}^{52}C_4} \times {}^{48}C_0 \quad (4)$$

$$= \frac{1}{270725} \quad (5)$$

So the probability that all four cards are kings is  $\frac{1}{270725}$ .

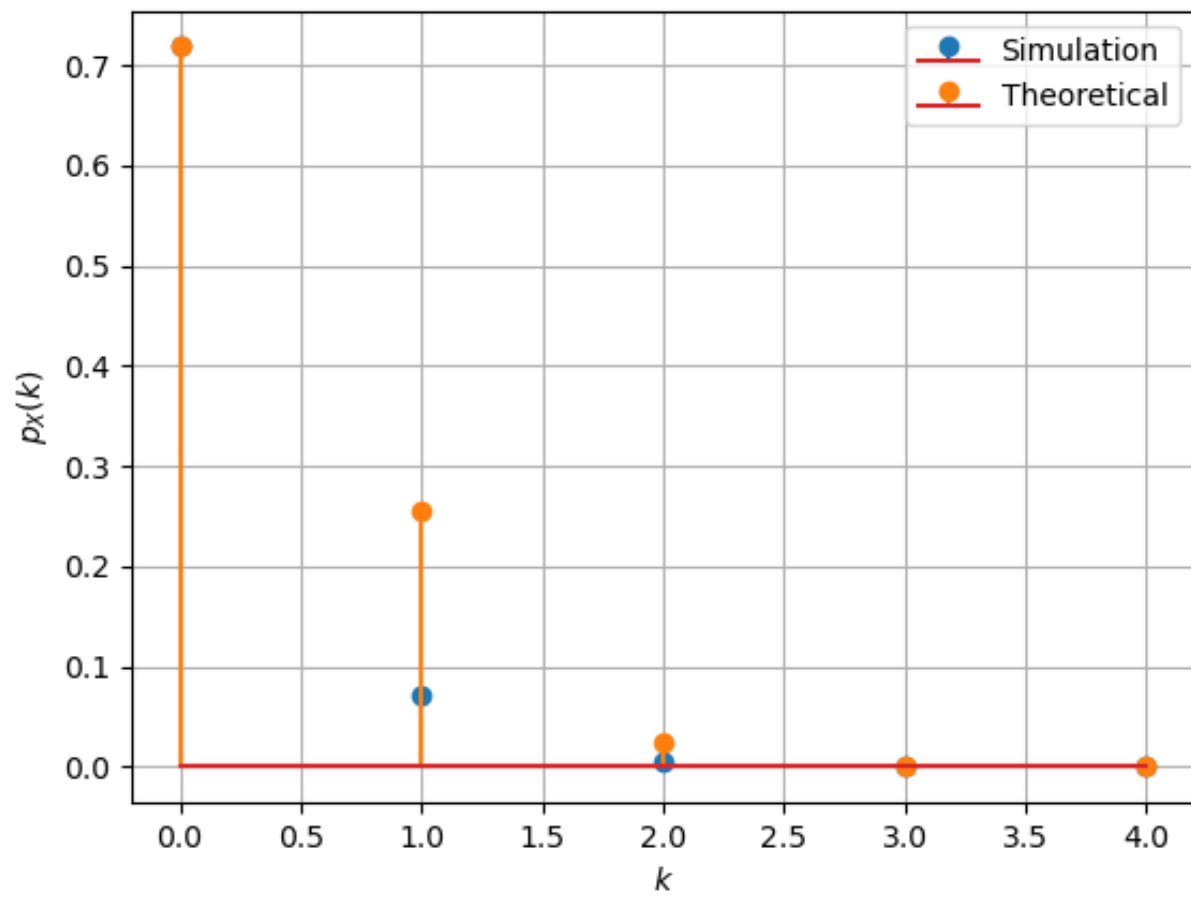


Fig. 0. PMF of  $X$