

Assignment Probability

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probability

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1 Problems

1. Q:11,16.4,4

- (a) one ticket
- (b) two tickets
- (c) 10 tickets

1. Q1: In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting a prize if you buy (a) one ticket (b) two tickets (c) 10 tickets ?

solution

| Variable | Value | Description |
|----------|---------------------|------------------------------------|
| N | 10000 | Total number of tickets sold |
| k | 10 | Total number of prizes awarded |
| n | $\{0,1,2,\dots,N\}$ | Number of tickets purchased |
| $\Pr(n)$ | | probability of not winning a prize |
| q | N-k | number of tickets with no prize |

Table 2: variable description

Total number of possible outcomes = ${}^N C_n$

Total number of favourable outcomes = ${}^q C_n$

Probability $\Pr(n) = \frac{{}^q C_n}{{}^N C_n}$

(a) **one ticket**

$$(n_1 = 1) \implies \Pr(n_1) = \frac{{}^q C_{n_1}}{{}^N C_{n_1}} = \frac{{}^{9990} C_1}{{}^{10000} C_1} = 0.9990 \quad (1)$$

(b) **two ticket**

$$(n_2 = 2) \implies \Pr(n_2) = \frac{{}^q C_{n_2}}{{}^N C_{n_2}} = \frac{{}^{9990} C_2}{{}^{10000} C_2} = 0.9980 \quad (2)$$

(c) **10 ticket**

$$(n_3 = 10) \implies \Pr(n_3) = \frac{{}^q C_{n_3}}{{}^N C_{n_3}} = \frac{{}^{9990} C_{10}}{{}^{10000} C_{10}} = 0.9901 \quad (3)$$