

Binomial Distributions Practice

1. If the probability of winning a game is $\frac{3}{5}$, then the probability of winning exactly 3 games out of 4 played is

- (a) 0.216 (b) 0.3456
 (c) 0.0864 (d) 0.8512

$${}^4C_3 \left(\frac{3}{5}\right)^3 \left(\frac{2}{5}\right)^1$$

2. When Nick plays cards with Lisa, the probability that Nick will win is $\frac{6}{10}$. If they play three games of cards and there are no ties, what is the probability that **Lisa** will win all three games?

$${}^3C_0 \left(\frac{6}{10}\right)^0 \left(\frac{4}{10}\right)^3$$

0.064

or ${}^3C_3 \left(\frac{4}{10}\right)^3 \left(\frac{6}{10}\right)^0$

3. If the probability of hitting a target is $\frac{3}{4}$, then the probability of hitting the target exactly once in four tries is

- (a) 0.012 (b) 0.105
 (c) 0.047 (d) 0.141

$${}^4C_1 \left(\frac{3}{4}\right)^1 \left(\frac{1}{4}\right)^3$$

4. In a family of six children, what is the probability that exactly one child is female?

- (a) 0.09 (b) 0.50
 (c) 0.11 (d) 0.91

↳ probability of girl = 0.50

$${}^6C_1 (0.5)^1 (0.5)^5$$

5. Each day the probability of rain on a tropical island is $\frac{7}{8}$. Which expression represents the probability that it will rain on the island exactly n days in the next 3 days?

(a) ${}^3C_n \left(\frac{7}{8}\right)^n \left(\frac{1}{8}\right)^{3-n}$

(b) ${}^nC_3 \left(\frac{7}{8}\right)^3 \left(\frac{1}{8}\right)^n$

→ total # of days (n)
 ↳ # of days of rain (k)

(c) ${}^3C_3 \left(\frac{7}{8}\right)^3 \left(\frac{1}{8}\right)^n$

(d) ${}^8C_7 (3)^n (3)^{8-n}$

$$\frac{4}{10} = .4$$

6. In basketball, Nicole makes 4 baskets for every 10 shots. If she takes 3 shots, what is the probability that exactly 2 of them will be baskets?

(a) 0.288

(b) 0.600

(c) 0.432

(d) 0.960

$$({}_3C_2)(.4)^2(.6)^1$$

7. The probability of Gordon's team winning any given game in a 5-game series is 0.3. What is the probability that Gordon's team will win exactly 2 games in the series?

$$({}_5C_2)(.3)^2(.7)^3 = 0.31$$

8. Gordon tosses a fair die six times. What is the probability that he will toss exactly two 5's?

~~(a)~~ ${}_6C_5\left(\frac{5}{6}\right)^2\left(\frac{1}{6}\right)^4$

(b) ${}_6C_5\left(\frac{1}{6}\right)^2\left(\frac{5}{6}\right)^4$

probability of rolling a 5 = $\frac{1}{6}$

~~(c)~~ ${}_6C_2\left(\frac{5}{6}\right)^2\left(\frac{1}{6}\right)^4$

(d) ${}_6C_2\left(\frac{1}{6}\right)^2\left(\frac{5}{6}\right)^4$

9. If three fair coins are tossed, what is the probability of getting at least two heads?

(a) 0.125

(b) 0.5

(c) 0.375

(d) 0.67

$$k=2,3 \quad P(\text{heads})=0.5$$
$$({}_3C_2)(.5)^2(.5)^1 + ({}_3C_3)(.5)^3(.5)^0$$

10. If a fair coin is tossed five times, what is the probability of tossing exactly three heads?

$$({}_5C_3)(.5)^3(.5)^2 = 0.31$$

11. A spinner is divided into five equal sectors labeled 1 through 5. What is the probability of getting at most two prime numbers in three spins?

prime: 1, $\boxed{2}$, $\boxed{3}$, 4, $\boxed{5}$ = $\frac{3}{5} = 0.6$

$$({}_3C_2)(.6)^2(.4)^1 = 0.432$$

12. A coin is biased so that the probability of obtaining heads is $\frac{3}{5}$. What is the probability of obtaining **at least** three heads in four tosses of the coin?

$$({}_4C_3)\left(\frac{3}{5}\right)^3\left(\frac{2}{5}\right)^1 + ({}_4C_4)\left(\frac{3}{5}\right)^4\left(\frac{2}{5}\right)^0$$

0.4752

13. The probability of the Mets winning a game against the Diamondbacks is $\frac{3}{4}$. If they are playing a three-game series this weekend, what is the probability that the Mets will win **at least** 2 out of 3 games?

$$({}_3C_2)\left(\frac{3}{4}\right)^2\left(\frac{1}{4}\right)^1 + ({}_3C_3)\left(\frac{3}{4}\right)^3\left(\frac{1}{4}\right)^0$$

0.84

15. At a university, the probability that an incoming freshman will graduate within four years is 0.553. Use the normal approximation to estimate, to the nearest thousandth, the probability that

(a) exactly 60 out of a group of 100 incoming freshman will graduate in four years.

$$({}_{100}C_{60})(0.553)^{60}(.447)^{40}$$

0.05

(b) exactly 80 out of a group of 150 incoming freshman will graduate in four years.

$$({}_{150}C_{80})(.553)^{80}(.447)^{70}$$

0.06