

Module 2 Review + Self-Test

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Practice problems

1. A fair six-sided die is rolled 12 times. What is the probability of rolling exactly 3 sixes?
2. A bakery sells an average of 3 specialty cakes per day. What is the probability they sell 5 cakes tomorrow?
3. A committee of 5 people is chosen from a group of 10 men and 8 women. What is the probability that exactly 3 women are chosen?

Solutions

1. A fair six-sided die is rolled 12 times. What is the probability of rolling exactly 3 sixes?

- Identify parameters: $n = 12$, $p = 1/6$, $k = 3$.
- Use Binomial PMF: $P(X = 3) = \binom{12}{3}(1/6)^3(5/6)^9$.
- Compute $\binom{12}{3} = 220$.
- Compute $(1/6)^3 \approx 0.00463$ and $(5/6)^9 \approx 0.1938$.
- Multiply: $220 \times 0.00463 \times 0.1938 \approx 0.1974$.

Answer: 0.1974

2. A bakery sells an average of 3 specialty cakes per day. What is the probability they sell 5 cakes tomorrow?

- Identify as a Poisson process with $\lambda = 3$.
- We want $P(X = 5)$.
- Use Poisson PMF: $P(X = 5) = \frac{3^5 e^{-3}}{5!}$.
- Compute $3^5 = 243$ and $5! = 120$.
- Compute $e^{-3} \approx 0.0498$.
- Calculate: $(243 \times 0.0498)/120 \approx 0.1008$.

Answer: 0.1008

3. A committee of 5 people is chosen from a group of 10 men and 8 women. What is the probability that exactly 3 women are chosen?

- Identify as Hypergeometric: $N = 18$, $K = 8$ (women), $n = 5$, $k = 3$.
- Use formula: $P(X = 3) = \frac{\binom{8}{3}\binom{10}{2}}{\binom{18}{5}}$.
- Compute $\binom{8}{3} = 56$ and $\binom{10}{2} = 45$.
- Compute $\binom{18}{5} = 8568$.
- Calculate: $(56 \times 45)/8568 = 2520/8568 \approx 0.2941$.

Answer: 0.2941