

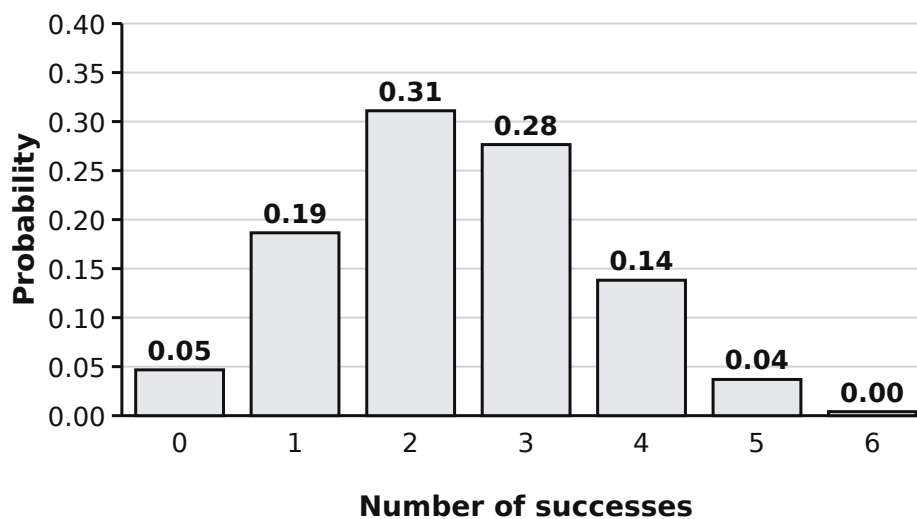
AP Statistics - Binomial and Geometric Distributions - Test Answer Key

Common Core AP STAT 4.10, AP STAT 4.11, AP STAT 4.12, HSS-MD.A.3, HSS-CP.B.9 · maths-pdf.fr/en/

Each solution includes a scoring guide. Give credit for naming the distribution and parameters, using the correct command or formula, and answering in context.

AP Statistics · Common Core State Standards: **AP STAT 4.10, AP STAT 4.11, AP STAT 4.12, HSS-MD.A.3, HSS-CP.B.9**

Question 1 - Binomial probability [4 pts]



Binomial with $n = 6$ and $p = 0.4$.

(a) 0.3110. (b) $1 - P(X \leq 3) = 1 - 0.8208 = 0.1792$. (c) $6(0.4) = 2.4$.

0.3110; 0.1792; 2.4.

Scoring: 1 point for (a), 2 points for (b) (1 for complement, 1 for value), 1 point for (c).

Question 2 - BINS [3 pts]

(a) Binary: made or missed. Independent: shots do not affect each other. Number: 15 fixed. Same $p = 0.45$.

(b) $\text{binompdf}(15, 0.45, 7) = 0.2013$.

Binomial with $n = 15$ and $p = 0.45$; $P = 0.2013$.

Scoring: 1 point for each pair of BINS conditions correctly checked (2 points), 1 point for the value.

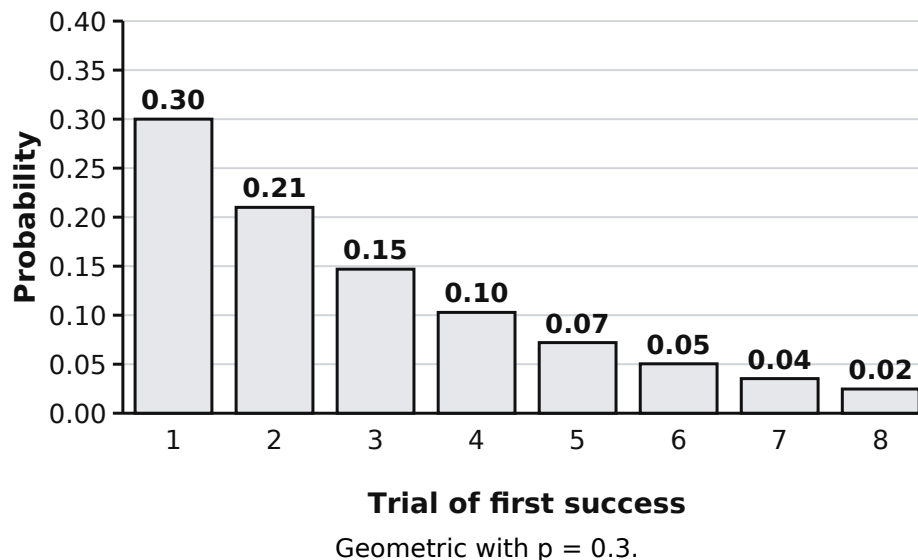
Question 3 - Mean and sd [2 pts]

$$\mu = 20(0.2) = 4. \quad \sigma = \sqrt{20(0.2)(0.8)} = \sqrt{3.2} = 1.789.$$

Mean 4, standard deviation 1.789.

Scoring: 1 point each.

Question 4 - Geometric [3 pts]



(a) $0.7^2(0.3) = 0.1470$. (b) $0.7^4 = 0.2401$. (c) $\frac{1}{0.3} \approx 3.33$.

0.1470; 0.2401; 3.33.

Scoring: 1 point per part.

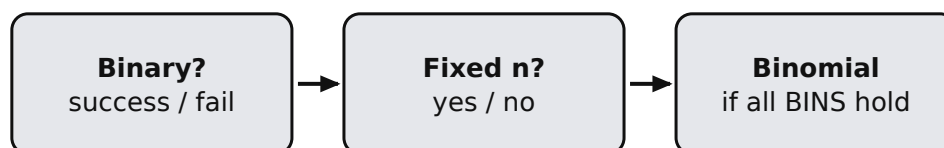
Question 5 - Unusual outcome [2 pts]

$$P(X \leq 12) = \text{binomcdf}(20, 0.85, 12) = 0.0059.$$

0.0059 is below 0.05, so the result is unusual and casts doubt on the 85% claim.

Scoring: 1 point for the value, 1 point for the conclusion.

Question 6 - Fixed number [1 pt]



The number of trials is not fixed in advance (and without replacement the trials are dependent).

The fixed Number condition fails.

Scoring: 1 point for naming the fixed number of trials condition.

Question 7 - Choose the model [2 pts]

(a) Binomial with $n = 12$ and $p = 1/6$. (b) Geometric with $p = 1/6$.

(a) binomial, $n = 12$, $p = 1/6$; (b) geometric, $p = 1/6$.

Scoring: 1 point each.

Question 8 - 10 percent condition [3 pts]

(a) The sample (5) is 12.5% of the population (40), more than 10%, so the trials are not independent enough for a binomial model.

(b) $\text{binompdf}(5, 0.25, 2) = 0.2637$, only a rough approximation.

Not binomial (10% condition fails); approximately 0.2637.

Scoring: 2 points for the condition check, 1 point for the value.

Total
20 points