

AP Statistics - Binomial and Geometric Distributions - Worksheet

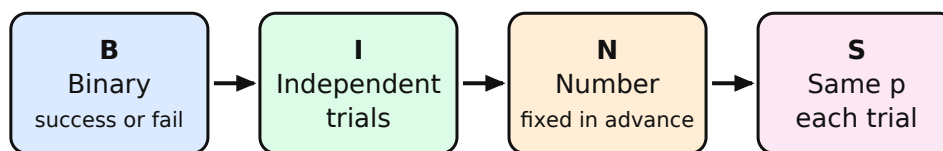
Common Core AP STAT 4.10, AP STAT 4.11, AP STAT 4.12, HSS-MD.A.3, HSS-CP.B.9 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice AP Statistics topics 4.10 to 4.12. You will check the BINS conditions, compute binomial and geometric probabilities with formulas and calculator commands, and find means and standard deviations.

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**

Exercise 1 - Check BINS



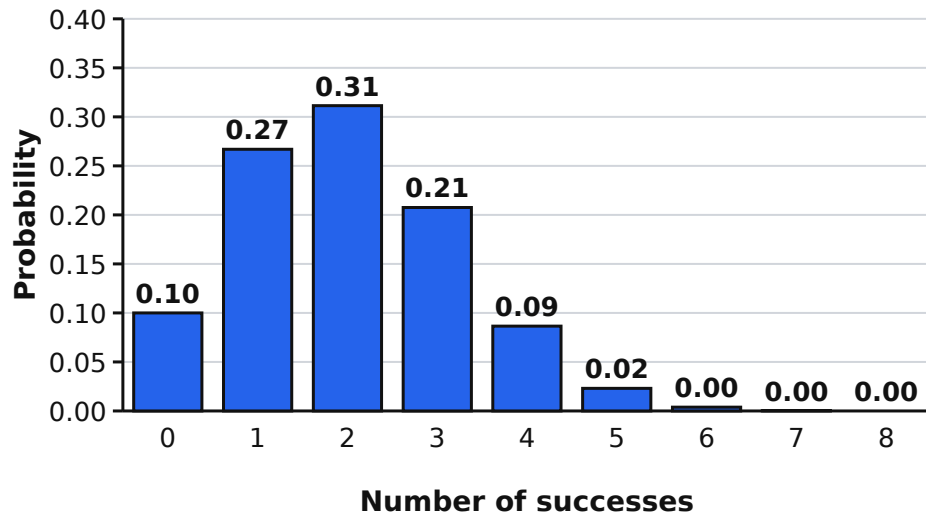
All four BINS conditions must hold.

Is each situation binomial? (a) The number of heads in 20 coin flips. (b) The number of cards drawn from a deck until the first ace. (c) The number of defective bulbs in a random sample of 15 from a factory that makes thousands, if 3% are defective. (d) The number of days it rains in a 30-day month in a city where rain on one day makes rain the next day more likely.

Exercise 2 - Binomial formula

A free-throw shooter makes 70% of her shots. Find the probability that she makes exactly 3 of 4 shots.

Exercise 3 - binompdf



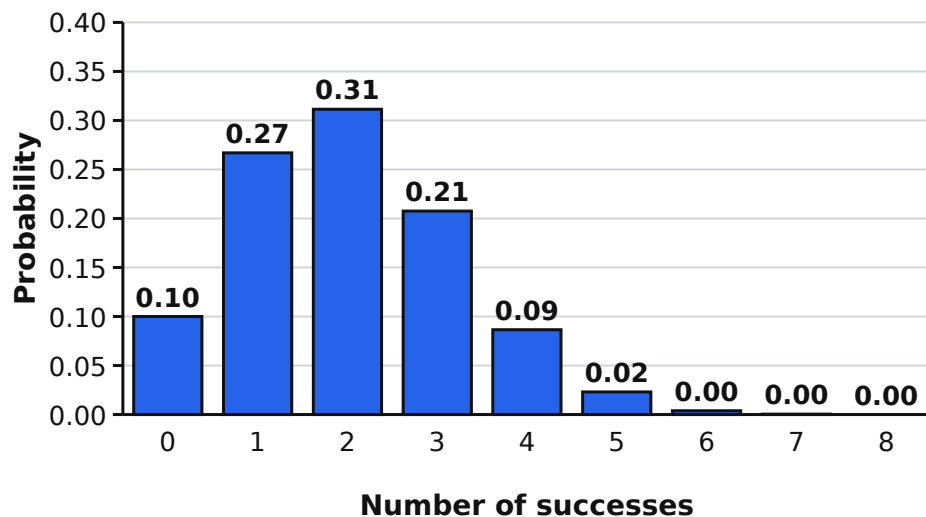
Binomial with $n = 8$ and $p = 0.25$: skewed right, mean 2.

A student guesses on 8 questions with 4 options each. Find $P(\text{exactly 2 correct})$ and $P(\text{exactly 5 correct})$.

Exercise 4 - binomcdf

Using the same guessing setup, find $P(\text{at most 3 correct})$.

Exercise 5 - At least



Guessing on 8 questions.

Using the same setup, find $P(\text{at least 4 correct})$.

Exercise 6 - Between

Find $P(2 \leq X \leq 4)$ for the guessing setup.

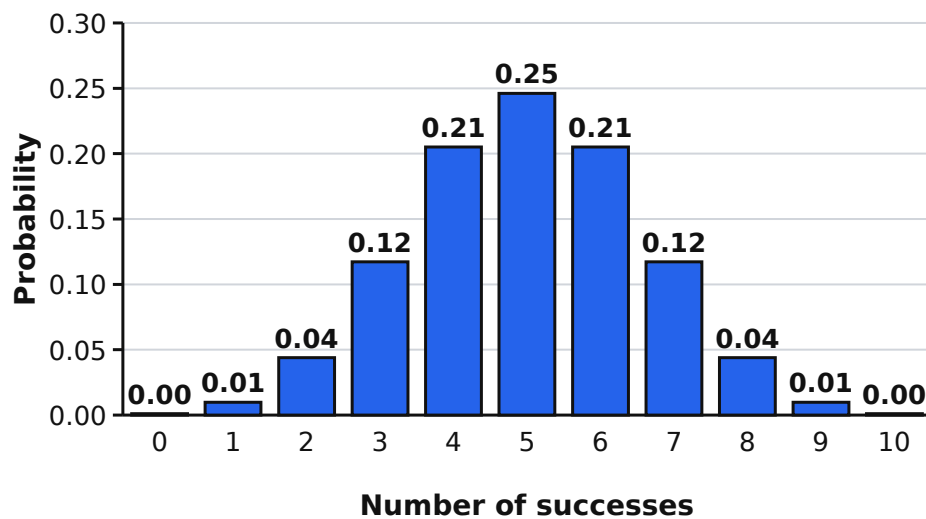
Exercise 7 - Mean and standard deviation

A basketball player makes 80% of her free throws. In 25 attempts, find the mean and standard deviation of the number made.

Exercise 8 - Interpret the mean

For the 25 free throws above, interpret the mean in context.

Exercise 9 - Shape



Binomial with $n = 10$ and $p = 0.5$.

Describe the shape of the binomial distribution with $n = 10$ and $p = 0.5$, and tell what happens to the shape when p is 0.1.

Exercise 10 - Unusual result

A basketball player makes 70% of shots. She makes 10 of 10. Is it unusual? Compute $P(X = 10)$ for $n = 10$, $p = 0.7$.

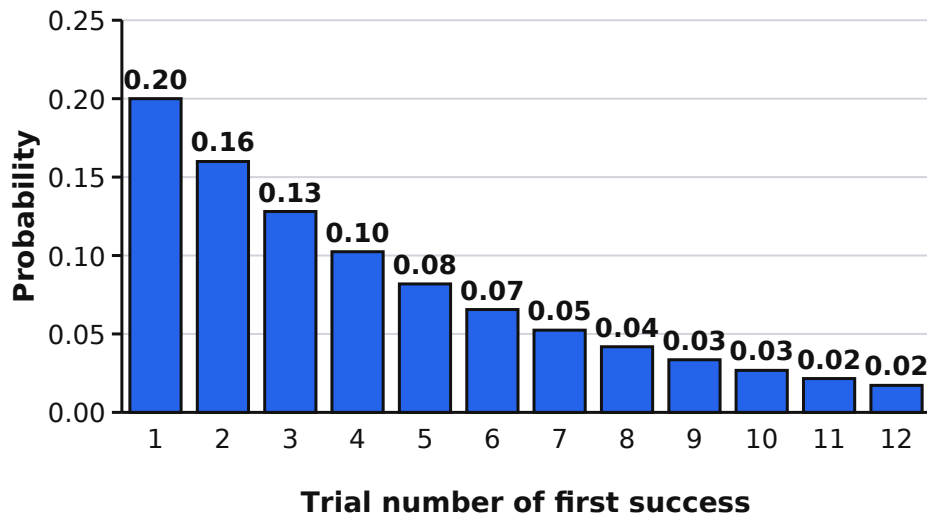
Exercise 11 - 10 percent condition

A class of 30 students includes 12 girls. Four students are chosen without replacement. Can the number of girls be modeled as binomial?

Exercise 12 - Geometric setting

Is each geometric? (a) Roll a die until a 6 appears; X is the number of rolls. (b) Roll a die 10 times; X is the number of 6s. (c) Draw cards from a shuffled deck without replacement until an ace appears.

Exercise 13 - Geometric probability



Geometric with $p = 0.2$: always skewed right, with the highest bar at 1.

20% of cereal boxes contain a prize. Find the probability that the first prize is in the 4th box.

Exercise 14 - More than n trials

For the prize boxes ($p = 0.2$), find the probability that more than 5 boxes are needed.

Exercise 15 - Geometric cumulative

For $p = 0.2$, find the probability that the first prize appears within the first 3 boxes.

Exercise 16 - Expected trials

A phone assembly test passes 12.5% of units on the first try. How many tests do you expect before the first pass? Interpret.

Exercise 17 - Geometric sd

For $p = 0.2$, find the standard deviation of the number of boxes until the first prize.

Exercise 18 - Exactly and at least

A quality inspector finds that 5% of items are defective. Out of 20 randomly selected items, find $P(\text{no defects})$ and $P(\text{at least one defect})$.

Exercise 19 - Compare binomial and geometric

A quarterback completes 60% of passes. (a) Find the probability he completes exactly 3 of the next 5. (b) Find the probability that his first completion in a drive is on the 2nd pass.

Exercise 20 - Multi-step

A bakery's muffins are underbaked 4% of the time. A box holds 12 muffins. Find the mean and standard deviation of underbaked muffins per box and the probability that a box has more than 2.