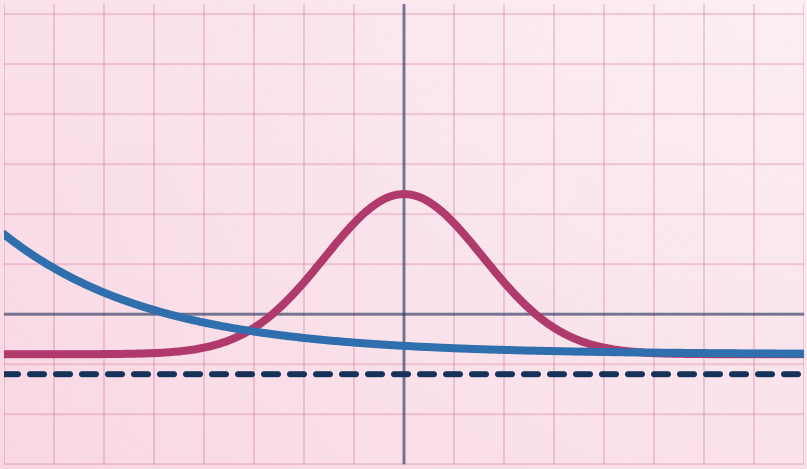
KECUDO

2026 EDITION · COLLEGE MATH SERIES



PROBABILITY & STATISTICS

Class H3

Probability Distributions

The shapes that chance takes

PREMIUM EDITION · KECUDO · H3

13 CHAPTERS · 120 SELF-ASSESSMENT QUESTIONS

INTERACTIVE EDITION + PRINT PDF

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FOUNDATION

Chapter 1

Discrete vs Continuous

A **discrete** distribution gives a probability to each countable value. A **continuous** distribution is a **density curve**: probabilities are areas under it, and the total area is 1.

	Discrete	Continuous
Values	countable: 0, 1, 2, ...	any value in an interval
Probability	P(X = x) from a table or formula	area under the density
P(X = exactly 30)	can be positive	always 0
Kecudo example	helmets sold, flats per day	ride length, wait time

WHY P(X = 30) = 0 FOR A CONTINUOUS VARIABLE

A single point has no width, so no area. Ask about intervals: P(29.5 < X < 30.5).

Every distribution has a mean μ (center) and standard deviation σ (spread)

●○○ FOUNDATION

Chapter 2

Bernoulli & Binomial

A **Bernoulli trial** has two outcomes: success (probability p) or failure. The **binomial** X counts successes in n independent trials with the same p.

$$P(X = k) = C(n, k)\, p^k\, (1 - p)^{n - k} \;\cdot\; \mu = np \;\cdot\; \sigma = \sqrt{(np(1 - p))}$$

WORKED EXAMPLE **Helmet add-ons: 20% of renters buy one; 10 renters**

1. $P(X = 2) = C(10, 2)(0.2)^2(0.8)^8 = 45 \cdot 0.04 \cdot 0.1678 \approx 0.302$.
2. $P(X = 0) = 0.8^{10} \approx 0.107$.
3. $\mu = 10 \cdot 0.2 = 2$; $\sigma = \sqrt{1.6} \approx 1.26$.

✓ **Expect about 2 helmets per 10 renters**

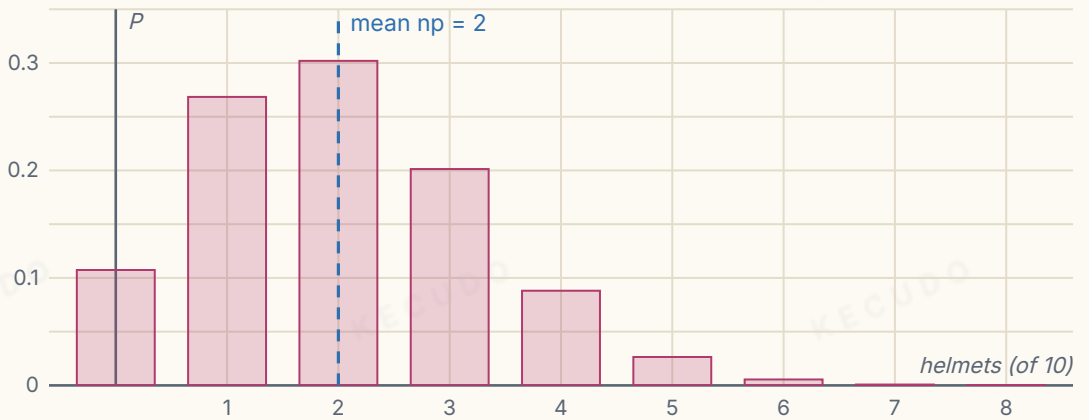


FIG 2.1 The binomial distribution with n = 10, p = 0.2: skewed right, peak at 2.

CHECK BINS

Binary outcomes, **I**ndependent trials, fixed **N**umber, same **S**uccess probability.

CHECK YOUR UNDERSTANDING

Chapter 1: Discrete vs Continuous

5 questions · your answer locks when you choose it

1. For a continuous variable, probability is:

- **A** a count
- **B** the curve's height
- **C** always 0.5
- **D** area under the density curve

2. Total area under a density curve:

- **A** any
- **B** 0
- **C** 1
- **D** 100

3. P(ride length = exactly 30 min):

- **A** 0
- **B** 1/60
- **C** 1
- **D** 0.5

4. Number of helmets sold is:

- **A** uniform
- **B** categorical
- **C** discrete
- **D** continuous

5. Wait time at the counter is:

- **A** discrete
- **B** categorical
- **C** binomial
- **D** continuous

FINAL EXAM

25 Questions on the Whole Book

Parts A–E · 5 questions each

Part A · Basics

1. A binomial counts:

A time between events
B events per hour
C successes in n trials
D trials until success

2. The Poisson mean and variance are:

A equal
B different
C both 1
D unrelated

3. A standard normal has:

A mean 0 and SD 1
B mean 0 and SD 0
C mean 1 and SD 0
D mean 30 and SD 10

4. The standard error of $\bar{x}$ is:

A σ/n
B $\sigma/\sqrt{n}$
C σ
D $\sigma\sqrt{n}$

5. The exponential distribution is:

A bounded
B discrete
C memoryless
D symmetric



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Thank you for learning with Kecudo.

NEXT IN THE SERIES

Class H4 · Statistical Inference