

INKMATHS FLASHCARDS

# Further Statistics 1 distributions and tests

13 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions in precise wording, the standard results the formulae booklet does not print, a check-yourself question per topic, and the slips that lose marks. The same cards run on the website with spaced-repetition scheduling, at [inkmaths.co.uk/flashcards](https://inkmaths.co.uk/flashcards).

**STANDARD RESULT**

Discrete variance:

$$\text{Var}(X) = ?$$

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

**STANDARD RESULT**

Linear transformation:

$$\text{Var}(aX + b) = ?$$

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**STANDARD RESULT**

Poisson:

$$X \text{ is Po}(\lambda): P(X = x) = ?$$

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**STANDARD RESULT**

Geometric:

$$P(X = x) = ?, \mu = ?$$

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**STANDARD RESULT**

Negative binomial:

$$\text{rth success on trial } x: P = ?$$

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**STANDARD RESULT**

Central Limit Theorem:

$$\text{sample mean} \approx ?$$

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**STANDARD RESULT**

Goodness of fit:

$$\chi^2 = ?$$

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**STANDARD RESULT**

Contingency table:

$$E_{ij} = ?, \text{degrees of freedom?}$$

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STANDARD RESULT

**$\sigma^2 \text{Var}(X)$ : the shift  $b$  contributes nothing**

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STANDARD RESULT

$$\sum x^2 P(X = x) - \mu^2$$

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STANDARD RESULT

$$p(1-p)^{x-1}, \mu = (1)/(p), \sigma^2 = (1-p)/(p^2)$$

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STANDARD RESULT

$$e^{-\lambda}(\lambda^x)/(x!), \text{ with } E(X) = \text{Var}(X) = \lambda$$

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STANDARD RESULT

$$N(\mu, (\sigma^2)/(n)), \text{ standard error } (\sigma)/(\sqrt{n})$$

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

STANDARD RESULT

$$x^{-1} C_{r-1} p^r (1-p)^{x-r}, \mu = (r)/(p)$$

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

STANDARD RESULT

$$(\text{row} \times \text{column})/(\text{total}), (r-1)(c-1)$$

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

STANDARD RESULT

$$\sum ((O_i - E_i)^2)/(E_i)$$

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

#### STANDARD RESULT

Generating function:

**$G(t) = ?$ , mean = ?**

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#### STANDARD RESULT

Variance from a PGF:

**$\text{Var}(X) = ?$**

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#### DEFINITION

Define: Power of a test.

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#### SPOT THE ERROR

Say what is wrong with this claim:

A test at the 5% level is wrong 5% of the time.

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#### CHECK YOURSELF

A goodness-of-fit test has 6 classes after pooling, with one parameter estimated from the data. State the degrees of freedom.

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

**STANDARD RESULT**

$$G''(1) + G'(1) - [G'(1)]^2$$

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

**STANDARD RESULT**

$$E(t^x), \text{ mean} = G'(1)$$

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

**SPOT THE ERROR**

The 5% is the chance of rejecting a true null hypothesis, and only when it is true. It says nothing about Type II errors, which are often far more likely, and it is a conditional probability rather than an overall error rate.

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

**DEFINITION**

The probability of correctly rejecting the null hypothesis at a stated alternative, equal to one minus the probability of a Type II error there.

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS

**CHECK YOURSELF**

$6 - 1 - 1 = 4$ : one lost to the fixed total, one to the estimated parameter.

FURTHER STATISTICS 1: DISTRIBUTIONS AND TESTS