

INKMATHS FLASHCARDS

Further Statistics 2

regression, densities and tests

15 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.

STANDARD RESULT

Least squares:

$$\mathbf{b} = ?, \text{RSS} = ?$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

DEFINITION

Define: Residual.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Density and distribution:

$$P(\mathbf{a} < \mathbf{X} \leq \mathbf{b}) = ?, f(\mathbf{x}) = ?$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Continuous mean and variance:

$$E(\mathbf{X}) = ?, \text{Var}(\mathbf{X}) = ?$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

DEFINITION

Define: Positive skew.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Continuous uniform:

$$U(\mathbf{a}, \mathbf{b}): E(\mathbf{X}) = ?, \text{Var}(\mathbf{X}) = ?$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Correlation coefficients:

$$\mathbf{r} = ?, r_s = ?$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

DEFINITION

Define: The correlation test.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

DEFINITION

The observed y minus the value the regression line predicts at the same x : a vertical gap. Least squares minimises the sum of their squares, and they always add to zero.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$$(s_{xy})/(s_{xx}), s_{yy} - ((s_{xy})^2)/(s_{xx})$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$$\int x f(x) dx, E(X^2) - [E(X)]^2$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$$\int_a^b f(x) dx, (dF(x))/(dx)$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$$(a + b)/(2), ((b - a)^2)/(12)$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

DEFINITION

Mode below median below mean, with the long tail running to the right. Reversing the order gives negative skew; all three equal means symmetric.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

DEFINITION

Hypotheses are about the population value ρ or ρ_s , never the sample r . Critical values fall as n grows, and the product moment version assumes a bivariate normal population.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$$(s_{xy})/(\sqrt{(s_{xx} s_{yy})}), 1 - (6 \sum d^2)/(n(n^2 - 1))$$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Combining normals:

$aX \pm bY$ is ?

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Standard error and interval:

$se = ?$, interval at 95 per cent = ?

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Difference of two means:

standard error = ?

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Testing a variance:

statistic = ?, degrees of freedom = ?

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

Pooled variance:

$s^2 = ?$, degrees of freedom = ?

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

SPOT THE ERROR

Say what is wrong with this claim:

A 95% confidence interval has a 95% chance of containing the population mean.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

CHECK YOURSELF

Two samples of sizes 13 and 9 give variances 24.5 and 8.2. State the F statistic and its degrees of freedom.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$(\sigma)/(\sqrt{(n)}), \text{ sample mean } \pm 1.96 \times \text{se}$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$N(a\mu_x \pm b\mu_y, a^2\sigma_x^2 + b^2\sigma_y^2)$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$((n-1)s^2)/(\sigma^2) \text{ is } \chi^2, n-1$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$\sqrt{((\sigma_x^2)/(n_x) + (\sigma_y^2)/(n_y))}$: the variances add

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

SPOT THE ERROR

The population mean is fixed, so once the interval is calculated it either contains it or does not. What varies is the interval: 95% of intervals built this way from repeated samples would capture the mean.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

STANDARD RESULT

$((n_1 - 1)s_1^2 + (n_2 - 1)s_2^2)/(n_1 + n_2 - 2), n_1 + n_2 - 2$

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS

CHECK YOURSELF

Larger variance on top: $F = 24.5/8.2 = 2.99$, on 12 and 8 degrees of freedom in that order.

FURTHER STATISTICS 2: REGRESSION, DENSITIES AND TESTS