

MA26620 Applied Statistics

A Revision Checklist

• Descriptive statistics

- Classification
 - * Qualitative vs quantitative
 - * Discrete (ordinal vs nominal) vs continuous (ratio vs interval)
- Measures of central tendency (mean, median, mode)
- Measures of spread (sample variance, sample standard deviation, range, interquartile range)

• Regression

- Correlation coefficient and its interpretation
- The linear regression model
- Corrected sums of squares (S_{xx} , S_{xy} , S_{yy})
- Least squares estimators ($\hat{\beta}_0$, $\hat{\beta}_1$ and hence the equation of the least squares regression line) and their derivation.

• Normal random samples

- Basic properties of Normal distributions
- Q-Q plots
- Central Limit Theorem
- Distribution of the sample mean
- Unknown variance: $ESE(\bar{X})$
- The t distribution
- Confidence interval for μ
- The t -test
- Comparing two independent Normal samples (two sample t-test)
 - * Two sample t -test (with and without assumption of equal variances)
 - * Two sample t confidence interval for the difference of means ($\mu_1 - \mu_2$), again with and without assumption of equal variances

• Discrete inference

- Binomial data
 - * Bernoulli trials
 - * Hypothesis tests
 - * $\hat{p}$ and its estimated standard error
 - * Normal and Poisson approximations
 - * Confidence interval for p
- The χ^2 test
- Poisson data
 - * Hypothesis tests
 - * $\hat{\lambda}$ and its estimated standard error
 - * Confidence interval for λ
 - * Normal approximation

• ANOVA

- One-way ANOVA
 - * The one-way ANOVA model
 - * The one-way ANOVA table
 - * Sums of squares and their expectations
 - * The one-way ANOVA F-test
 - * Contrasts (estimating contrasts, associated sum of squares, orthogonality)
- Two-way ANOVA
 - * The two-way ANOVA model
 - * The two-way ANOVA table
 - * Restrictions on parameters, and estimating the α_i , β_j and γ_{ij}
 - * Two-way ANOVA F-tests
 - * Interaction plots

NB: This list is not intended to be exhaustive. Make sure you revise from a combination of your lecture notes, exercises from the practicals, the topic summaries on the module webpages, past papers, textbooks and any other resources you find useful.