Revision notes for Mathematics AS1051

These notes are intended to give some guidance as to suitable topics to revise, and to remind you of the the main points in the course.

Format of the progress test

The progress test lasts 90 minutes and consists of 6 questions. You are expected to answer all of them. These may be similar to the kind of questions on courseworks and exercise sheets, but may also ask for definitions or other standard facts which you are supposed to know.

You should make sure you have revised any questions which have arisen on the coursework, or on the examples sheets.

Course content

I list the most important topics only:

Chapter 1: Definitions of number systems and properties of integers, laws of indices, binomial coefficients and the binomial theorem, $_nC_r$ and $_nP_r$, roots of polynomials, remainder/factor theorem, rational functions and partial fractions, arithmetic and geometric progressions.

Chapter 2: Domain, range, and codomain of a function, injective and surjective functions, inverse functions, square root and modulus functions, trigonometric functions: graphs, behaviour, special values, identities, general solutions to trigonometric equations, log and exp, simultaneous equations, inequalities.

Chapter 3: Coordinate systems, lines and circles, conic sections.

Chapter 4: Differentiation from first principles, standard functions, compound function rules, higher derivatives, Leibnitz rule, implicit and parametric functions, tangents and normals, stationary points/points of inflexion.

Chapter 5: Antiderivatives, standard results, substitution, inverse substitution, integration by parts, definite integrals, area.

Chapter 6: Definition of inverse trigonometric functions and basic properties, including differentiation and integration, integration using $\tan(x/2)$, hyperbolic functions: definitions and basic properties, solving hyperbolic equations, their calculus, inverse hyperbolic functions.

Chapter 7: An informal definition of limits and basic properties, limits of quotients for polynomials, l'Hôpital's rule, sums of series, Taylor/Maclaurin series, Leibnitz' theorem, the formal definition of a limit.

Chapter 8: Sets and subsets, intersections, unions and other set operations, Venn diagrams and membership tables, propositional and predicate logic.

Chapter 9: Direct proofs, indirect proof by contrapositive and contradiction, existence proofs, proof by induction.

Note that the formal definition of a limit is not examinable. Also the final two chapters (with the exception of proof by induction) will not be examined in the progress test.