MA1S11 (Calculus Portion) — Academic year 2016–17
Guidance on preparing for the Annual and Supplemental Examinations 2017

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Basic Calculus Skills

Correct use of laws of indices Are you familiar with the situations in which you can validly apply laws of indices? And can you apply them correctly in those situations?
Background notes : Subsections 1.11, 1.21 and 1.22
Tutorials: 2

Trigonometric identities Can you correctly apply standard trigonometrical identities in transforming mathematical formulae?
Background notes: Subsections 6.1–6.4.
Tutorials: 2

Polynomials, their roots and derivatives Can you apply standard rules for finding roots of polynomials? Are you familiar with the Factor and Remainder Theorems, and can you apply these theorems in determining, from first principles, the derivatives of polynomials?
Background notes : Section 2, also Subsections 4.2–4.5.
Tutorials: 4, 5

Injective, surjective and bijective functions Do you understand the definitions and concepts of injective, surjective and bijective functions and apply them to functions whose domains and codomains are subsets of the set of real numbers?
Background notes: Section 3. See also Subsection 4.11.
Tutorials: 3, 5

Formal definitions and analysis of limits Are you familiar with, do you understand, and are you able to apply formal definitions of limits, expressed in terms of ε and δ in standard fashion? Also are you familiar with the standard rules that relate limits and continuity, and that determine limits of sums, differences, products, quotients and (where appropriate) compositions of functions? Do you have an overview of the results of this sort that are available to you to apply in order, for example, to justify results involving limits and/or continuity with rigour without the necessity of constructing explicit ε–δ proofs?
Background notes: Subsection 4.2, 4.7, 4.9, 4.10, 4.13, 4.14, 4.15.
Tutorials: 4, 6

Rules of Differential Calculus Are you familiar with the basic rules of Differential Calculus, and can you apply them in differentiating functions of standard familiar types?
Background notes: Subsections 5.1–5.6 5.12.
Tutorials: 7, 8

Local Maxima, Minima and Points of Inflection Can you apply Differential Calculus in locating maxima, minima and points of inflexion of twice-differentiable functions?
Background notes: Subsections 5.7, 5.11 and 5.12.
Tutorials: 5, 7

Derivatives of basic transcendental functions Trigonometric functions, inverse trigonometric functions, exponential functions and logarithm functions are examples of *transcendental functions.* Can you differentiate correctly expressions involving these transcendental functions?
Background notes: Subsections 6.5–6.7, 8.1, 8.3.
Tutorials: 8, 9

Basic Integration Theory Do you understand how the definite integral of a function can be interpreted in terms of areas between the graph of that function and the x-axis? Do you understand the statement and implications of the Fundamental Theorem of Calculus as presented in the notes? Can you evaluate basic integrals by techniques justified as applications of the Fundamental Theorem of Calculus? *Background notes*: Subsections 7.5, 7.6 *Tutorials*: 8, 9 Can you apply the rule for Integration by Substitution stated in Proposition 7.26?

Integration by Substitution *Background notes*: Subsections 7.7 *Tutorial*: 10

Specific Definitions Lemmas, Propositions, Theorems and Corollaries

The following list contains a list of lemmas, propositions, theorems and corollaries that may be relevant to the Calculus questions on the MA1S11 paper at the annual examination in 2015. Some specified that the *result and proof* are examinable. This should be taken to mean that you should be familiar not only with the stated result but also the proof of the result, because you might be called upon in the examination either to supply a proof of the result itself or else to apply proof techniques exemplified in the proof in order to prove a similar result. Other lemmas, propositions, theorems and corollaries are specified as *result only*. For these, you should be able to recall and/or locate the result, and make use of it in applications (e.g., in applications resembling those that appeared on the tutorials). Note that you should be provided at the examination with the standard *Formulae and Tables* booklet that is provided to candidates at Leaving Certificate examinations. You are therefore advised to correlate results listed below with the information in *Formulae and Tables*, so that, during the examination, you know where to look for relevant information.

The list of examinable results is as follows:—

Lemma 1.4	result only
Lemma 1.5	result only
Proposition 1.7	result only
Proposition 1.8	result only
Proposition 1.9	result only
Proposition 1.14	result only
Proposition 1.15	result only
Proposition 1.16	result only
Lemma 2.1	result only
Lemma 2.2	result only
Proposition 2.4	result only
Theorem 2.6	result only
Theorem 2.7	result only
Lemma 3.1	result only
Lemma 3.2	result only
Proposition 3.3	result only
Lemma 3.4	*result and proof*
Lemma 3.5	*result and proof*

Proposition 4.2	result only
Proposition 4.5	result only
Proposition 4.6	*result and proof*
Proposition 4.8	result only
Lemma 4.10	*result and proof*
Lemma 4.11	*result and proof*
Lemma 4.12	*result and proof*
Lemma 4.13	*result and proof*
Proposition 4.15	result only
Lemma 4.16	result only
Proposition 4.17	result only
Proposition 4.18	result only
Corollary 4.19	result only
Proposition 4.20	result only
Proposition 4.21	result only
Proposition 4.22	result only
Proposition 4.23	result only
Corollary 4.25	result only
Corollary 4.26	result only
Proposition 4.27	result only
Theorem 4.28	result only
Theorem 4.29	result only
Proposition 4.30	*result and proof*
Corollary 4.31	result only
Proposition 4.32	result only
Proposition 4.33	result only
Lemma 4.34	*result and proof*
Lemma 4.35	result only
Lemma 5.1	*result and proof*
Proposition 5.2	*result and proof*
Proposition 5.3	*result and proof*
Proposition 5.4	*result and proof*
Proposition 5.5	result only
Proposition 5.6	result only
Proposition 5.7	*result and proof*
Proposition 5.10	result only
Corollary 5.11	result only
Proposition 6.1	result only
Proposition 6.2	result only
Proposition 6.3	result only
Proposition 6.4	result only
Proposition 6.5	result only

Corollary 6.6	result only
Corollary 6.7	result only
Corollary 6.8	result only
Corollary 6.9	result only
Proposition 6.11	result only
Corollary 6.12	result only
Proposition 6.13	*result and proof*
Corollary 6.14	*result and proof*
Proposition 6.16	result only
Proposition 6.18	result only
Corollary 7.7	result only
Lemma 7.8	result only
Proposition 7.9	result only
Lemma 7.10	result only
Proposition 7.11	result only
Theorem 7.17	result only
Corollary 7.18	*result and proof*
Corollary 7.19	*result and proof*
Corollary 7.20	*result and proof*
Corollary 7.21	*result and proof*
Corollary 7.22	*result and proof*
Corollary 7.23	result only
Corollary 7.24	result only
Proposition 8.1	*result and proof*
Proposition 8.5	result only
Lemma 8.6	result only
Proposition 8.7	result only
Corollary 8.8	result only
Proposition 8.11	result only
Corollary 8.12	result only
Proposition 8.14	result only
Corollary 8.15	result only
Proposition 8.18	*result and proof*