Edexcel Further Maths AS-level

Further Pure 2

Formula Sheet

Provided in formula book	Not provided in formula book

Groups

Lagrange's theorem	If H is a subgroup of a finite group G then $\lvert H \rvert$ divides $\lvert G \rvert$

Further Matrix Algebra

Eigenvalues and Eigenvectors

An eigenvector of a matrix A is non-zero column vector $\boldsymbol{x}$, satisfying the equation $\boldsymbol{Ax} = \lambda \boldsymbol{x}$, where λ is a scalar called the eigenvalue corresponding to the eigenvalue $\boldsymbol{x}$.
The eigenvalues of A satisfy the characteristic equation $\det(\boldsymbol{A} - \lambda \boldsymbol{I}) = 0$

Form of the diagonal matrix, $\boldsymbol{D}$, of a matrix $\boldsymbol{A}$	$\boldsymbol{D} = \boldsymbol{P}^{-1}\boldsymbol{AP}$ where $\boldsymbol{P}$ consists of the eigenvectors of $\boldsymbol{A}$ $\boldsymbol{D}$ has the respective eigenvalues of A on the leading diagonal

Cayley-Hamilton theorem	Every square matrix $\boldsymbol{M}$ satisfies its characteristic equation

Complex Numbers

Loci

For $z_1 = x_1 + iy_1$ and $z_2 = x_2 + iy_2$

Loci of points z such that $\lvert z - z_1 \rvert = r$	Circle with centre (x_1, y_1) and radius r
Loci of points z such that $\lvert z - z_1 \rvert = \lvert z - z_2 \rvert$	Perpendicular bisector of the segment of the line joining z_1 and z_2
Loci of points z such that $\lvert z - a \rvert = k\lvert z - b \rvert$, where $a, b \in \mathbb{C}$ and $k \in \mathbb{R}, k > 0, k \neq 1$	Circle (find the centre and radius by finding the Cartesian equation)
Locus of points z such that $\arg(z - z_1) = \theta$	Half line from, but not including z_1 that has an angle θ with the line from z_1 parallel to the real axis
Locus of points z such that $\arg\left(\frac{z-a}{z-b}\right) = \theta, \theta \in \mathbb{R}, > 0$	Arc of a circle with endpoints at the points representing $a, b \in \mathbb{C}$

Number Theory

Bezout's identity	If $a, b \neq 0, a, b \in \mathbb{Z}$, then there exists $x, y \in \mathbb{Z}$ such that $\gcd(a, b) = ax + by$

Further sequences and series

First Order Recurrence Relations

Solution of the recurrence relation $u_n = au_{n-1}$	$u_n = u_0 a^n$ or $u_n = u_1 a^{n-1}$
Solution to the recurrence relation $u_n = u_{n-1} + g(n)$	$u_n = u_0 + \sum_{r=1}^{n} g(r)$

Particular Solutions for Recurrence Relations of the Form $u_n = au_{n-1} + g(n)$

Form of $g(n)$	Particular solution
p with $a \neq 1$	λ
$pn + q$ with $a \neq 1$	$\lambda n + \mu$
kp^n with $p \neq a$	λp^n
ka^n	$\lambda n a^n$
p with $a = 1$	λn
$pn + q$ with $a = 1$	$\lambda n^2 + \mu n$