COMPLEX NUMBER SYSTEMS & OPERATIONS

Advanced Mathematics Reference Sheet

Fundamental Representations

Rectangular	`z = a + bi`
Polar	`z = r(cos Î¸ + i sin Î¸)`
Exponential	`z = re^{iÎ¸}`

Conversion Constants

Modulus (r)	`|z| = âˆš(aÂ² + bÂ²)`
Argument (Î¸)	`tanâ»Â¹(b/a)`
Conjugate (zÌ„)	`a - bi`

Advanced Theorems & Identities

Euler's Identity

$$e^{i\pi} + 1 = 0$$

De Moivre's Theorem

$$[r(\cos\theta + i\sin\theta)]^n = r^n(\cos n\theta + i\sin n\theta)$$

Complex Functions & Calculus

Operation	Definition / Identity
Complex Logarithm	`ln(z) = ln|z| + i(arg z + 2kÏ€)`
n-th Roots	`w_k = â¿âˆšr [cos((Î¸ + 2kÏ€)/n) + i sin((Î¸ + 2kÏ€)/n)]`
Hyperbolic Relation	`sin(iz) = i sinh(z)` | `cos(iz) = cosh(z)`

Geometric Interpretation (Argand Diagram)

[Plot Area: Horizontal Axis (Re) / Vertical Axis (Im)]
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