

# TABLE OF CONTENT OF MY NOTES FOR MATH 6110 (FALL 2006)

## I The modular group and its subgroups

- § 1 Linear fractional transformations (pp. 1–5)
- § 2 Poincaré's model of hyperbolic geometry (pp. 6–17)
- § 3 The modular group (pp. 18–31)
- § 4 A fundamental domain of the modular group (pp. 32–37)
- § 5 Subgroups of the modular group (pp. 38–62)

## II Modular forms

- § 6 The notion of a modular form (pp. 63–67)
- § 7 Examples (pp. 68–78)
- § 8 The valence formula (pp. 79–89)
- § 9 The  $j$ -function and the inversion problem for Eisenstein series (pp. 90–96)
- §10 The Dedekind  $\eta$ -function (pp. 97–102)
- §11 Euler's pentagonal number theorem (pp. 103–106)

## III Hecke-Petersson theory

- §12 Basic properties of Hecke operators (pp. 107–116)
- §13 The Petersson scalar product (pp. 117–118)
- §14 The coefficient formula and the completeness theorem for Poincaré series (pp. 119–124)
- §15 The action of  $T_n$  on Poincaré series; Self adjointness of the  $T_n$  (pp. 125–128)
- §16 Dirichlet series corresponding to modular forms (pp. 129–133)
- §17 Eigenfunctions of Hecke operators and Dirichlet series with Euler products (pp. 134–139)

## IV Theta series

- §18 Positive definite quadratic forms (pp. 140–143)
- §19 Theta series attached to quadratic forms (pp. 144–154)