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Eisenstein Series and Automorphic Representations

with Application in String Theory

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Chapter 4: Automorphic Forms

p62, l3: 'co-called' should be replaced by 'so-called' *[J. Gerken, 30/7/2018]*

p63, (4.21): The standard notation $(c, d) = 1$ on the sum means that c and d are co-prime: $\gcd(c, d) = 1$. *[J. Gerken, 30/7/2018]*

p65, (4.33): The standard notation $(m, n) = 1$ on the sum means that m and n are co-prime: $\gcd(m, n) = 1$. *[J. Gerken, 30/7/2018]*

p66, (4.35): The correct formula is

$$\left(\phi|_{k,m}\gamma\right)(\tau, z) = (c\tau + d)^{-k} e^{2\pi i m\left[-\frac{c(z+\lambda\tau+\mu)^2}{c\tau+d}+\lambda^2\tau+2\lambda z+\lambda\mu\right]} \phi\left(\frac{a\tau + b}{c\tau + d}, \frac{z + \lambda\tau + \mu}{c\tau + d}\right) . \tag{4.35}$$

The $+\lambda\mu$ in the phase is only relevant when considering covers of the Jacobi group. For $\lambda, \mu \in \mathbb{Z}$ it can also be removed since m is an integer. *[J. Gerken, 30/7/2018]*

p66, (4.39): The argument of ϕ on the left-hand side of the first line should be the matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ acting on τ to give the first line

$$\phi\left(\frac{a\tau + b}{c\tau + d}, \frac{z}{c\tau + d}\right) = (c\tau + d)^k e^{2\pi i m \frac{cz^2}{c\tau+d}} \phi(\tau, z) . \tag{4.39}$$

[J. Gerken, 30/7/2018]

p73, (4.74): The correct functional relation (appearing in (1.25) and other places in the book) is

$$\xi(\mathbf{2}s)E(s, z) = \xi(\mathbf{2}(1 - s))E(1 - s, z) . \tag{4.74}$$

[J. Gerken, 30/7/2018]

p74, (4.82): The standard notation $(c, d) = 1$ on the sum means that c and d are co-prime: $\gcd(c, d) = 1$. *[J. Gerken, 30/7/2018]*

Chapter 6: Whittaker Functions and Fourier Coefficients

p135, Prop. 6.20: The map $\varphi = f \circ \phi^{-1} : G(\mathbb{Q})\backslash G(\mathbb{A})/K_f \to \mathbb{C}$ is missing its target.

p151, Table 6.2: The entry for π_{ntm} for $E_{6(6)}$ can be expanded as follows. Next-to-minimal representations for $E_{6(6)}$ are found for *generic* s_1 as well as for *generic* s_6. $s_5 = 1$ is also next-to-minimal as already stated.

Chapter 7: Fourier Coefficients of Eisenstein Series on $SL(2, \mathbb{A})$

p166, (7.64ff): The argument leading from (7.64) to (7.67) is incorrectly separated into local factors. A global argument giving (7.67) is as follows. Since ψ is non-degenerate, there is a $t \in N(\mathbb{A})$ such that $\psi(t) \neq 1$. But since

$$\int\limits_{N(\mathbb{Q})\backslash N(\mathbb{A})} \overline{\psi(n)} dn = \int\limits_{N(\mathbb{Q})\backslash N(\mathbb{A})} \overline{\psi(nt)} dn = \overline{\psi(t)} \int\limits_{N(\mathbb{Q})\backslash N(\mathbb{A})} \overline{\psi(n)} dn$$

by translation invariance, the integral (7.64) vanishes. *[J. R. Love, 26/3/2021]*

Chapter 9: Whittaker Coefficients of Eisenstein Series

p203, (9.73): The sign of ρ in the exponents should be changed in the second and third line.

Chapter 10: Analysing Eisenstein Series and Small Representations

p237, (10.67): Some entries contain too many squares. The correct table is

w	$M(w, \lambda)$
$\mathbb{1}$	1
w_1	$c(2s-1)$
$w_2 w_1$	$c(2s-1)c(2s-2)$
$w_3 w_2 w_1$	$c(2s-1)c(2s-2)c(2s-3)$
$w_4 w_2 w_1$	$c(2s-1)c(2s-2)c(2s-3)$
$w_4 w_3 w_2 w_1$	$c(2s-1)c(2s-2)c(2s-3)^2$
$w_2 w_4 w_3 w_2 w_1$	$c(2s-1)c(2s-2)c(2s-3)^2 c(2s-4)$
$w_1 w_2 w_4 w_3 w_2 w_1$	$c(2s-1)c(2s-2)c(2s-3)^2 c(2s-4)c(2s-5)$

(10.67)

Chapter 11: Hecke Theory and Automorphic L-functions

p262, (11.29): There is a typo in the argument of the modular form. The correct formula is

$$(T_n f)(z) = n^{k-1} \sum_{d|n} d^{-k} \sum_{b=0}^{d-1} f\left(\frac{\mathbf{n}z + bd}{d^2}\right) \qquad (f \text{ holomorphic of weight } k) \tag{11.29}$$

Chapter 13: Elements of String Theory

p322, Table 13.2: The factor $\mathbb{Z}_2$ in the discrete subgroup $G(\mathbb{Z})$ in the row $d = 1$ should be removed.

Chapter 14: Automorphic Scattering Amplitudes

p380, (14.25): Applying (10.89) to the Whittaker coefficient of Example 10.27 leads to a prefactor $\frac{4\zeta(3)}{\xi(3)}$ instead of $\frac{4\zeta(3)}{\xi(4)}$.

p381, (14.27): As in the correction to (14.25), the prefactor should be $\frac{4\zeta(3)}{\xi(3)}$ instead of $\frac{4\zeta(3)}{\xi(4)}$.

p381, (14.28): Working out the corrected prefactor in (14.27) leads to 8π instead of $\frac{180\zeta(3)}{\pi^2}$.

p391, (14.43): The sequence of differential operators is $\mathcal{D}_{11}\mathcal{D}_{10}\cdots\mathcal{D}_0$.