Examination topics of
"Special functions of mathematical physics"
Jan Dereziński, Summer Semester 2023/24

1. The Gamma function.
2. Infinite products, with applications to trigonometric functions and the Gamma function.
3. The Laplace method and asymptotics of integrals.
4. Regular singular points of differential equations and the Frobenius method.
5. The Riemann equation (equation with 3 regular singular points on the Riemann sphere).
6. The hypergeometric equation.
7. The Bessel equation.
8. Circular waves as solutions of 2-dimensional Helmholtz equation.
9. Weighted L^2 spaces and orthogonal polynomials.
10. Classical orthogonal polynomials (Hermite, Laguerre and Jacobi).
11. Spherical harmonics as eigenfunctions of the spherical Laplacian.
12. Projection onto spherical harmonics of degree l.
13. Relationship between solid harmonics and spherical harmonics.