Below are projects that you can choose. Or you can decide on a project on your own. All projects must be approved by MJA. Please provide a title and one-two paragraph description of your project no later than Monday Oct. 21.

Riemann–Hilbert problems

- Nonlinear waves: inverse scattering transform (IST) cf. books/research by MJA and others or
- Study of orthogonal polynomials or
- Random matrix models or
- Asymptotic analysis when there is an additional large parameter. cf. P. Deift , X. Zhou et al

DBAR

- DBAR in nonlinear waves — inverse scattering transf (IST) cf. books/research by MJA and others or
- DBAR in electro-tomagraphy cf. research by J. Mueller and others

Riemann mapping theorem

Discuss a proof of the theorem, its ramifications, etc. Discuss some of the important developments that have occurred since the early proofs.

Riemann zeta function

Explain some of what is known (history) and important associated mathematics. Discuss what the open questions are.

Numerical conformal mapping

- Schwarz–Christoffel mappings of polygons or
- Numerical mappings of circular triangles.

Schwarz–Christoffel mappings in multiply connected domains

- bounded domains or
- unbounded domains

Solutions of ODEs/PDEs in the complex plane

- Discuss relations of Painlevé type equations to integrable NL wave equations or
- Discuss relations of Painlevé type equations to probability theory, random matrices, etc. or
- Explain important results known about the classical 2nd order Painlevé eq or
- Solutions of classical Painlevé eq by the inverse monodromy transform (IMT) or
- Discuss Fokas method to solve linear BVPs or
- Discrete Painlevé equation or
- Solutions of ODEs in the complex plane by numerical methods