Differential equations:

Differential equations are the most important in calculus and physics. There are classical methods of solving ordinary differential equations reducing them to separable differential equations, using integrating factor, characteristic equations, etc. This includes solving exponential growth, logistic growth, oscillatory differential equations, etc.

Fourier method is often used to solve partial differential equations: the unknown function is expanded in Fourier series, the coefficients of the series are found from simultaneous linear algebraic equations. This is similar to using Fourier transform for solving differential equations.