[illegible] open end ...

For computing $M_2(\Gamma_0(N))$:

- "Compute" G_Γ $\quad (\Gamma = \Gamma_0(N))$
- Compute a ($\mathbb{Z}$-)basis for $X_2(\Gamma)$: $\lambda_1, \dots, \lambda_d$
- Compute $\sum_{L \geq \ell \geq 1} (T(\ell)\lambda_i)(v)\, q^\ell$ for $v \in G_\Gamma$
  for sufficiently large L, such that you find d_p many linearly independent poly's among these; the corresponding power series form a basis for $M_2(\Gamma_0(N))$.

Remarks

- There exist variants of this algo to
  - compute more efficiently
  - directly Hecke eigen new forms
  - improve the formulas for $T(\ell)$
  - etc.
- Works mutatis mutandis also for higher weight.