**Exercise 1.** Let $q \in \mathbb{R}^{n \times m}$. Convince yourself that the projection $\hat{p}$ of $q$ onto the $\ell^{2,\infty}$ ball of radius one,

$$B_{\ell^{2,\infty}} = \left\{ p \in \mathbb{R}^{n \times m} \mid \sqrt{\sum_{j} (p_{ij})^2} \leq 1, \forall i \right\},$$

i.e.

$$\hat{p} = \arg \min_{p \in B_{\ell^{2,\infty}}} \|p - q\|_2,$$

is given by

$$\hat{p}_{ij} = \frac{q_{ij}}{\max \left( \sqrt{\sum_{j} (q_{ij})^2}, 1 \right)}.$$

**Exercise 2.** Implement the gradient projection algorithm for isotropic as well as for anisotropic TV image denoising. How do the results differ for large regularization parameters?