1. Task 1
   Explain in detail the properties of the BM3D algorithm. Is it local or nonlocal? Is it pointwise or multipoint? What kind of models and model selection procedures are used in BM3D? What does the collaborative filtering mean?

2. Task 2
   For which cases the non-Gaussian image processing technique with the variance stabilization is convenient?
   
   a) What is the result of the Anscombe transform?
   
   b) Show the structure of the denoising algorithm applied to Poissonian data.

3. Task 3
   
   a) Explain the meaning of the global penalty (10) on page 184.
   
   b) Derive the formula for the image estimate $\hat{Y}$ on page 201.
   
   c) Why the minimization of formula (12) on page 192 over $\Omega_r$ results in the hard-thresholding of $\Omega_r'$ (formula (13), page 195)?

   Hint (3c): The image $Y$ (and respectively its block-wise 3D spectra $\Omega_r'$) in the functional are fixed, and therefore the minimization concerns only $PEN[\{\Omega'_r\}_r, \{\Omega_r\}_r]$. Note that $PEN[\{\Omega'_r\}_r, \{\Omega_r\}_r]$ contains only additive terms with respect to each element $\Omega_r(m, n, k)$ of the 3D spectra estimates $\Omega_r$. This means that the minimization can be done in an element-wise manner, i.e. for each element $\Omega_r(m, n, k)$ of the 3D spectrum $\Omega_r$, now each one-dimensional minimization (for each element $\Omega_r(m, n, k)$) can be done by considering that the function to be minimized is a sum of the parabola $(\Omega_r(m, n, k) - \Omega_r'(m, n, k))^2$ and the function $\lambda_r \|\Omega_r(m, n, k)\|_{l_0}$. What values does the latter function $\lambda_r \|\Omega_r(m, n, k)\|_{l_0}$ take for different values of its argument $\Omega_r(m, n, k)$? Now for which values of $\Omega_r(m, n, k)$ can the minimum of $(\Omega_r(m, n, k) - \Omega_r'(m, n, k))^2 + \lambda_r \|\Omega_r(m, n, k)\|_{l_0}$ occur?