**Hands-on exercises**

**Question 1.**

(a) Based on the given information, the projection matrix is given by:

Assumption: skew = 0

(b) In total, the projection of a 3D point onto the screen is performed in 3 stages:

* 1. The points is translated and rotated into the camera coordinates using Rotation + translation matrix
  2. The point is translated into the homogeneous coordinates
  3. The homogenous coordinates are being normalized into the regular pixel position coordinates

Solving each step separately:

1. Convert the 3D point into Camera coordinates
2. Get the homogenous coordinates:
3. Obtaining the normalized (real) coordinates:

(c) Re-Projection error – is defined as:

In our case:

Meaning: