Some tips for doing problem sets:

- Use abbreviations for trigonometric functions (e.g. cθ for cos(θ), s1 or sθ1 for sin(θ1)) in situations where it would be tedious to repeatedly write sin, cos, etc.
- Unless instructed otherwise, leave square roots in symbolic form rather than writing out their decimal values.
- If you give a vector as an answer, make sure that you specify what frame it is given in (if it is not clear from context). The same rule applies to rotation and transformation matrices.

Given a transformation matrix:

$$ {}^{A}_{B}T = \begin{pmatrix} \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} & 1 \\ -\frac{1}{2} & \frac{1}{\sqrt{2}} & \frac{1}{2} & 2 \\ -\frac{1}{2} & -\frac{1}{\sqrt{2}} & \frac{1}{2} & 3 \\ 0 & 0 & 0 & 1 \end{pmatrix} = \begin{bmatrix} {}^{A}_{B}R_{3x3} & {}^{A}M_{3x1} \\ 0\ 0\ 0_{1x3} & 1 \end{bmatrix}_{4x4} $$

1. Shows that ${}^{A}_{B}R_{3x3}$ is a rotation matrix
2. What is the meaning of columns and rows of ${}^{A}_{B}R_{3x3}$ *and* ${}^{A}M$
3. If ${}^{B}P = \begin{bmatrix} 4 & 5 & 6 & 1 \end{bmatrix}^{T}$, what doest it means ${}^{A}P = {}^{A}_{B}T\,{}^{B}P$
4. If $T = {}^{A}_{B}T$ *and* ${}^{A}P_1 = \begin{bmatrix} 4 & 5 & 6 & 1 \end{bmatrix}^{T}$, what doest it means ${}^{A}P_2 = T\,{}^{A}P_1$
5. Find ${}^{B}_{A}T$
6. Extrac the *X-Y-Z* fixed Angles
7. Determine a unit vector, (axis of rotation) and the angle of rotation of ${}^{A}_{B}R_{3x3}$.
8. What are the Euler parameters ε1, ε2, ε3, ε4 of R?
9. Write a script in Matlab *'.m' file* and use the RTB for solving questions: 1, 3, 4, 5, 6, 7 and 8

Note: Tell me how long it takes you to do Homework#1