CSCI 4250/5250 in-class exercise

Object transformation problem:
(a) Write out the following 4x4 matrices and label each with the following names:

        T0: Translate along X-axis by 4 and along Y-axis by 3

        R: Rotate about the z-axis by 45 degrees

        T1: Translate along X-axis by -4 and along Y-axis by -3

        S: Scale along X-axis by a factor of 2 and along Y-axis by a factor of 4 (z is unchanged)

(b) Assume you have an object you want to rotate by 45 degrees around a z-axis centered at (4, 3, 0). Using the symbols T0, R, and T1, show the correct order of composition of these matrices to perform the desired rotation.

(c) Find the composite matrix M by multiply out your answer from question 1.b.

(d) Apply the transformation matrix M to the 3D point P=(7, 5, 7) to find the transformed point Q by multiply it out.