MAU11S02 Group A2 Quiz 06 3pm 13/3/19

Rules and procedures.
1. Answers must be handed up at the end of the tutorial, no other time. **2.** Attempt 3 questions. Only *your first three answers* will be marked. **3.** Each question carries 10 marks, so the maximum quiz mark is 30. **4.** Marked quizzes will be returned, and answers published, the following week. **5.** If a particular method of solution is stipulated, you get no marks if you don't use it. **6.** The (9) quizzes will contribute 20% to your overall mark. **7.** You are allowed to collaborate and compare answers during the tutorial. **8.** ***Show all work.*** No marks will be given for answers which do not show the calculations.

Question 1. Construct a right-handed orthonormal basis X_1, X_2, X_3 where X_3 is in the direction $(0, -1, -1)$. Your answer should give the 3×3 matrix S whose columns are X_1, X_2, X_3.

Question 2. Give the matrix A' for rotation through angle $45°$ around the z-axis, and calculate SA' where S is the matrix from Question 1.

Question 3. Hence or otherwise calculate the matrix for $45°$ rotation around the axis through $(0, -1, -1)$.

Question 4. Given the points $(-3, -1)$ $(-2, 0)$ $(-1, -1)$ $(1, 1)$ we need their least-squared error linear estimator $y = mx + c$.

Reduce the problem to a system of equations in two unknowns:

$$A^T A \begin{bmatrix} m \\ c \end{bmatrix} = A^T Y$$

Question 5. Hence find the linear least-squared-error estimate.