MAU11S02 Group A1/2 Quiz 06 11/3/20

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 20 marks, so the maximum quiz mark is 60. **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.

This week you complete the homework outside the tutorial, because of Coronavirus.

Submit your completed homework (remember to put your name on it) to the Mathematics Department Office by 4pm on Wednesday 11 March.

Question 1. Let $P = (1, 2, 3, 4)$ and $Q = (2, 3, 4, 1)$. Use the $A^T AY = A^T X$ formula to calculate α, β so that $\alpha P + \beta Q$ is as close as possible to the point $X = (1, 0, 2, 0)$.

Question 2. (i) Give the matrix A' for 60° rotation around the z-axis in $\mathbb{R}^3$. In the fifth quiz, an orthonormal basis was constructed whose third vector was on the axis through $(1, -1, 1)$: the change of basis matrix S is published on the web. (ii) Calculate SA'.

Question 3. Calculate the matrix for rotating points through 60° around the axis $(1, -1, 1)$ using the formula $SA'S^T$.

Question 4. Calculate the matrix for perpendicular projection onto the plane $3x - 4y = 0$.

Question 5. Calculate the result of rotating the point $(2, -1, 1)$ through 45° around the axis through $(3, -4, 0)$.