MAU11S02 Group A1 Quiz 05 9am 27/2/19

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.

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

Question 2. Treating the orthonormal basis constructed in Question 1 as a 'new' basis, convert 'new' coordinates $[1\ \sqrt{3}\ \sqrt{3}]^T$ to 'old.'

Question 3. Treating the orthonormal basis constructed in Question 1 as a 'new' basis, convert 'old' coordinates $[1\ 1\ 1]^T$ to 'new.' (You could exploit the fact that the matrix S of Question 1 is an orthogonal matrix.)

Question 4. Calculate the perpendicular projection of the point $(1, 3, 4)$ onto the line through O and $(1, -1, 1)$.

Question 5. Calculate the perpendicular projection of the point $(1, 3, 4)$ onto the plane satisfying the equation $x - y + z = 0$.