Homework 2
F17CC Introduction to university mathematics

This homework will contribute 10% to your final course grade. Your solutions should be **stapled together** *with a signed and completed* **coursework submission form**. *These forms can be found in the corridor joining CM and EM on the first-floor — ask in the School Office if you cannot find them. Your solutions should be posted in the Mathematics postbox between CM and EM* **by 3.30 pm Friday 11th November**. *Late work will not be marked and you will automatically receive zero. You will be marked on the clarity of your solutions and the accuracy of your reasoning.*

(1) Find the square roots of $-21 + 20i$ and show that your solutions work. [5 marks]

(2) The following real polynomial

$$p(x) = x^6 - 5x^5 + 11x^4 - 15x^3 + 14x^2 - 10x + 4$$

has amongst its roots i and two integers. Find all of its roots and write $p(x)$ as a product of real linear and real irreducible quadratic polynomials. [5 marks]

(3) Calculate the determinant, adjugate and inverse of the following real matrix:

$$A = \begin{pmatrix} 2 & 4 & 6 \\ 0 & 1 & 4 \\ 5 & 6 & 0 \end{pmatrix}$$

[5 marks]

(4) Prove that there are *exactly two* 2×2 real matrices A that satisfy the following two conditions: first, A commutes with **all** 2×2 real matrices and second, $\det(A) = 1$. [5 marks]