Homework 1
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 27th October**. **Late work will not be marked and you will automatically receive zero. I am not joking. Don't even think about it!** *You will be marked on the clarity of your solutions and the accuracy of your reasoning.*

Each question is worth 5 marks.

(1) Use the binomial theorem to calculate the coefficient of $x^{30}y^{12}$ in the binomial expansion of $(4x - 6y)^{42}$. [If you use Pascal's triangle you will automatically receive -10^{80} marks].

(2) Find the two square roots of the complex number $-56+390i$ and show that your solutions work.

(3) Express $\cos 6x$ in terms of $\cos x$ and $\sin x$. [You must use de Moivre's theorem otherwise you will receive -10^{80} marks].

(4) Find all the roots of the following polynomial and write the polynomial as a product of real linear and real irreducible quadratics:

$$x^5 - 13x^4 + 60x^3 - 130x^2 + 144x - 72.$$

Set 6th October 2017