CSU11001 Homework II

This **individual homework assignment** will be marked out of 20.
Please write your **NAME** on the top of the first page.
Submit your solution online on mymodule.tcd.ie by
8pm on Thursday 28th October.

Q1 (3 marks)

(a) Taking the last three digits of your identity number IN REVERSE ORDER as x, y, z find the values of b_1, b_2 and b_3 for the following three equations i.e. substitute in your values for x, y and z to find b_1, b_2 and b_3.

$$\begin{aligned} 2x + y - 2z &= b_1 \\ 2x + 3y + z &= b_2 \\ 3x + 2y + 2z &= b_3 \end{aligned}$$

(b) Using your values for b_1, b_2 and b_3, state the set of equations you have formed.

For example if the last three digits of your id number are 123, then you have $x = 3$, $y = 2$, $z = 1$. From the first equation your will find $2(3) + 2 - 2(1) = 6 + 2 - 2 = 6$. Hence, $b_1 = 6$ and the first equation in your set becomes $2x + y - 2z = 6$.

Q2 (6 marks)

(a) Solve the set of equations you formed in Question 1(b) using Gaussian Elimination.

(b) How do you know that the solution you found in Question 2(a) is correct?

Q3 (5 marks)
Solve the set of equations you formed in Question 1(b) (again) using Cramer's Rule.

Q4 (6 marks)

(a) Using your values for b_1 and b_2 from Question 1(b) let $b_4 = b_2 - b_1$ and form the set of equations

$$\begin{aligned} 2x + y - 2z &= b_1 \\ 2x + 3y + z &= b_2 \\ 2y + 3z &= b_4 \end{aligned}$$

(b) Use Gaussian elimination to find the solution to the set of equations you found in Question 4(a).

Note: To obtain full marks you will need to lay your work out in clear logical steps so that the reader can see exactly how you obtain one line from the previous one. You should show all your workings clearly, in particular please use equal signs where appropriate. Don't be afraid to use sentences in English to help explain what you are doing and why. Remember that Gaussian Elimination/Gauss-Jordan elimination requires you to reduce the matrix to reduced row echelon form.

Homework Submission: Submit your work as a **SINGLE PDF FILE**. Please submit handwritten work that you have scanned or taken photos of, or work that you have handwritten on a tablet. Remember to combine your scanned files into a single pdf if necessary. Typeset work (e.g. that created using LaTeX or Microsoft Word with equation editor) will only be allowed in exceptional circumstances – please email Meriel.Huggard@tcd.ie to obtain permission to typeset your work.