MATH2000 summer tutorial quiz 1

CREDIT WILL BE GIVEN ONLY FOR WORK WRITTEN ON THIS SCRIPT.
Use the back of pages if the space provided is insufficient, or for rough working.
The last page is blank and can be used for rough working.

You should attempt all three questions.

This quiz constitutes 9% of your final grade.

Calculators are **not** allowed.

This quiz is closed book – no additional materials are permitted

You have 30 minutes to complete the questions.

There is no perusal time.

Family name:

Given names:

Student number:

Signature:

EXAMINER'S USE ONLY

Q1	Q2	Q3	TOTAL
/3	/3	/3	/9

1. *(3 marks)*

You are given that $y = Ax^3 + Bx$ is the general solution to the differential equation

$$x^2 y'' - 3xy' + 3y = 0.$$

Determine the general solution to the differential equation

$$x^2 y'' - 3xy' + 3y = 4x^5 e^{-x^2}.$$

2. (3 marks)
Express the inverse hyperbolic cotangent function ($\coth^{-1}(x)$ or $\text{arcoth}(x)$), for $x > 1$, in terms of the natural logarithm.

3. (3 marks) Calculate the volume below the surface $z = 6x + 3y + 1$ and above the region in the x-y plane bounded by $y = 0$, $x = 1$ and $y = x$.