Mathematics ABC — Midterm — 45 minutes

October 43th 2318

- The test consists of 5 pages and 3 questions worth a total of 20 marks.
- This is a closed-book examination. **None of the following are allowed**: documents, cheat sheets or electronic devices of any kind (including calculators, cell phones, etc.)
- No work on this page will be marked.
- Fill in the information below before turning to the questions.

Student number								
Section								
Name	. . . . .							
Signature								

Please do not write on this page — it will not be marked.

Additional instructions

- Please use the spaces indicated.
- If you require extra paper then put up your hand and ask your instructor.
  - You must put your name and student number on any extra pages.
  - You must indicate the test-number and question-number.
  - Please do this **on both sides** of any extra pages.
- Please do not dismember your test. You must submit all pages.
- Smoking is strictly prohibited during the test.

Formula sheet

You may find the following formulas useful in the questions that follow.

$$
\begin{aligned}
a^2 + b^2 &= c^2 \\
e^{i\pi} + 1 &= 0 \\
\sum_{i=1}^{n} i &= \frac{n(n+1)}{2} \\
\frac{\mathrm{d}}{\mathrm{d}x}(f+g) &= \frac{\mathrm{d}f}{\mathrm{d}x} + \frac{\mathrm{d}g}{\mathrm{d}x} \\
\int (f+g)\mathrm{d}x &= \int f\mathrm{d}x + \int g\mathrm{d}x \\
\cos(a+b) &= \cos a \cos b - \sin a \sin b \\
\sin(a+b) &= \sin a \cos b + \cos a \sin b \\
A \cup (B \cap C) &= (A \cup B) \cap (A \cup C) \\
A \cap (B \cup C) &= (A \cap B) \cup (A \cap C) \\
\overline{A \cap B} &= \overline{A} \cup \overline{B} \\
\overline{A \cup B} &= \overline{A} \cap \overline{B}
\end{aligned}
$$

1. [5 marks] Please place your answers in the boxes provided.

   (a) Find the derivative of $\sin(x^2y^3)$ with respect to x.

   Answer: $2xy^3\cos(x^2y^3)$

   Solution: We calculate the partial derivative. We also need the chain rule.

   (b) Another little thing here.

   Answer: $\sin(x)$

   Solution: Putting in your solutions ahead of time really helps calibrate your test.

   (c) A third thing

   Answer: $\int \sin(x)dx$

   Solution: Yet another solution goes here.

$$\int \sin(x)dx = -\cos(x) + C$$

   Note— (-1) if no $+C$

2. [5 marks] Please place your answers in the boxes provided. [Note if mark this question as "fix" in the spec it will always be chosen from version 1; version 2 will never be used.]

   (a) Answer something not quite so simple

   Answer: ABC

   Solution: Some working will go here. Like the question, the solution will not be so simple and may span several lines, and have some rubric information for the marker to use.

   (b) Another less simple thing here.

   Answer: $\sin(x)$

   Solution: Putting in your solutions ahead of time really helps calibrate your test. If the answer is $\sin(x)$ what was the question?

   (c) A third thing unsimple thing here.

   Answer: $\int \sin(x)dx$

   Solution: Yet another solution goes here. This one looks similar to a previous solution. Maybe there is a subtle difference in the solution which we should really make very clear to the grader (and student) here.

3. [10 marks] A long question goes here. In fact it is sufficiently long that we make sure you have a whole extra blank page for your work.

Solution: A long solution here. Maybe it even contains a diagram? A careful diagram is a beautiful thing.