Mathematics 1 2019-29

FEEDBACK **7**

Feedback Exercise 7

These questions relate to the material in Weeks 14 and 15. These feedback exercises are due by **4pm on Tuesday February 11th, handed in electronically through the course Moodle page.** Late submissions will not be accepted. You must submit your solutions to the feedback exercises through Moodle. Your work must be legible and be in a single PDF file. A PDF scan of your work can be created by scanning your work on any photocopier in the university, for upload to Moodle. **We will not accept or grade photographed work.**

One of the aims of this course is to develop mathematical writing skills. These will be assessed explicitly in the feedback exercises using assessment criteria outlined in **SOLVE: communicating mathematics in writing** (see the course information sheets on Moodle). **These feedback exercises will be graded out of 30 marks, with 15 marks awarded for writing and 15 for mathematics.**

We encourage you to talk to each other about mathematics, and work in groups to understand the material in this course and the exercises. However, your final submitted feedback exercise must be your own work. This means that it is suitable to talk about the problems and get the ideas together, but you should do the final write up alone. You also should not show another student your final submission.

FB1

a) Use (i) the Midpoint Rule and (ii) Simpson's Rule to approximate the integral

$$\int_2^4 \frac{\mathrm{d}x}{\sqrt{x^2+1}},$$

using $n = 10$ grid intervals. Round your answer to 6 decimal places.

b) Compute the integral exactly using antiderivatives and decide which method from part (a) is closest to the true value.

FB2 Let S be a set, and let A and $\{B_i \mid i \in \mathbb{N}\}$ be subsets of S. Is it true that

$$A \cup (\bigcap_{i\in\mathbb{N}} B_i) = \bigcap_{i\in\mathbb{N}} (A \cup B_i)?$$

If so provide a proof, and if not provide a counterexample.

FB3 Consider the relation $\sim$ on $\mathbb{R} \times \mathbb{R}$ defined as follows for all $(x, y), (a, b) \in \mathbb{R} \times \mathbb{R}$.

$$(x, y) \sim (a, b) \text{ if and only if } x - a = y - b.$$

Show that $\sim$ is an equivalence relation and describe geometrically how this relation partitions the plane.