MAS116/117: HOMEWORK 2

SIMON WILLERTON

1. Mathematics and Statistics at the University of Sheffield

There is a strong research profile of mathematics and statistics at the University of Sheffield. Research is divided into the following research groups.

- Algebra
- Analysis
- Category Theory
- Differential Geometry
- Environmental Dynamics
- Fluid Dynamics
- Mathematical Biology
- Nonlinear Control
- Number Theory
- Particle Astrophysics and Gravitation
- Probability and Statistics
- Solar Physics and Space Plasma Research Centre
- Topology

2. Dr Sam Marsh's research interests

Sam Marsh gained his PhD in *algebraic topology*, which is a branch of pure mathematics involved in the study of spaces by algebraic means. His PhD thesis concerned using a collection of so-called *cohomology theories* known as the Morava E-theories to better understand spaces related to the general linear groups, and was carried out under the supervision of Professor Neil Strickland.

Now employed as a teaching fellow, Sam is currently more interested in logic and set theory whose aim is to understand the nature of the foundations of mathematics. He has a soft spot for the work of Kurt Gödel, whose incompleteness theorem is simultaneously one the greatest results of the twentieth century and a complete irrelevance.

The above information was obtained from the following two websites.

- `https://www.sheffield.ac.uk/mps/people/all-academic-staff/sam-marsh`

- `https://sam-marsh.sites.sheffield.ac.uk/`

3. Solution re-write

3.1. **Question.** A line L passes through the points $A = (8, 1)$ and $B = (2, 3)$. Find the equation of L.

3.2. **Solution.** The line L has equation $y = mx+c$, where m is the gradient and c is the y-intercept. Since points A and B both lie on L, we have

$$m = \frac{3-1}{2-8} = \frac{2}{-6} = -\frac{1}{3}.$$

It follows, using point A, that $c = 1 - 8(-1/3) = 1 + 8/3 = 11/3$. Hence the equation of L is

$$y = \frac{11}{3} - \frac{x}{3}.$$