

MAS115: HOMEWORK 2

SAM MARSH

1. MATHEMATICS AND STATISTICS AT THE UNIVERSITY OF SHEFFIELD

The School of Mathematics and Statistics has the following main 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 of the greatest results of the twentieth century and a complete irrelevance.

3. SOLUTION RE-WRITE

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

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 $c = 1 - 8 \cdot (-1/3) = 1 + 8/3 = 11/3$. Hence the equation of L is

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