Readers who have access to *The Mathematical Intelligencer* and who want to get a sense of what this book is like can refer to pages 23-27 of issue 4 of volume 38 (2016) of that magazine, where the 'math museum' was first introduced. This book is a vastly enlarged version of this article. It contains a (slightly) different cast of characters, but the underlying idea of having mathematical discussions while exploring the museum have not much changed.

The main text of the book is broken up into 23 chapters, most of them just a few pages long, each discussing some interesting topic in mathematics. (One of these, as you may have guessed, is the Hairy Ball theorem from topology; others include Fermat's Last Theorem, the Riemann Hypothesis, the Monty Hall problem, and the RSA cryptosystem.) These chapters take up roughly half the book. The remaining half is a series of appendices, one for each of the chapters, containing additional discussion and a selection of problems, ranging from rather simple to thought-provoking.

Anyone looking for a genuinely exciting science-fiction adventure should likely look elsewhere; the underlying math museum plot serves primarily as a framing device for the various mathematical vignettes. These vignettes, of course, are the heart of the book. They are clearly and interestingly written, and require minimal background in mathematics to understand; high-school mathematics is enough to get through this book. The underlying museum-escape plot of the book, though far from Adams' funniest work, provides a way of linking these vignettes into a coherent whole that secondary and college students should find moderately entertaining as well as informative; they will learn from this book (as Kallie did) that mathematics is not just boring rote equation-solving.

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Comic sections plus by Des MacHale, pp. 264, £15.67 (paper), ISBN 978-1-4717-6147-8 Logic Press (2022)

All that fans of the first edition, *Comic sections*, [1], need to know is that *Comic sections plus* is an entirely reset and considerably expanded second edition, reflecting Des MacHale's on-going heroic quest to collect and collate humorous mathematical material, much of it in the form of "anecjokes" and quotations. This reviewer, 30 years on from penning [1], finds himself in the position of E. C. Titchmarsh who, "once gave a course lasting two terms, the first from January to April and the second from October to December. He opened the second half of the course by saying, 'Hence …'." (p. 45)

Wryly humorous, each item in the 12 sections of the book says something—often something profound—about the nature of mathematics and mathematicians.

'Deep' items include one involving Littlewood who, "when lecturing on branches of mathematics which frequently involved the factor $\frac{1}{2\pi}$ in front of the integral sign, used to adopt the convention that $2\pi = 1$" (p. 57), and Ulam's enigmatic, "The infinite we do right away. The finite may take a little longer." (p. 239).

Other entries reflect the fragility of learner's understanding.

"$\lim_{8 \to 9} \sqrt{8} = 3$" (p.133)

"There are $n\sqrt{2}$ elements on the diagonal of an $n \times n$ matrix." (p. 135)

"*Question*: Prove that $\sqrt{3} - \sqrt{2}$ is an irrational number.

Answer: $\sqrt{3} = 1.732$; $\sqrt{2} = 1.414$; $\sqrt{3} - \sqrt{2} = 0.318 = \frac{1}{\pi}$, which is irrational." (p. 126)

There are some glimpses of eternal verities.

"Every proof is a one-line proof if you start sufficiently far to the left." (p. 161)

"A proof tells us where to concentrate our doubts." (p. 196)

"What mathematics needs is fewer people telling us what mathematics needs" (p. 160)

And, of course, there are some splendid jokes.

"What is an anagram of Banach-Tarski?

 - Banach-Tarski Banach-Tarski." (p. 187)

"What do you call a young eigensheep?

- A lamb, duh." (p. 187)

"Old MacDonald had a form $e_i \times e_i = 0$." (p. 175)

There are also some lovely limericks, including this gem on p. 122:

"The mathematics of nature, quoth he,

Is wondrously brought home to me,

When I think that a clock

With each tick and tock

Goes $2\pi\sqrt{\frac{l}{g}}$."

In the Preface, Des MacHale offers advice on the use of humour in the classroom, arguing that, to ensure decorum, jokes ought to be served as desserts rather than entrées. But perhaps there is room for flexibility? Littlewood in his *Miscellany*, [2], recalls that the "Euler formula $\zeta(s) = \Pi\left(1 - p^{-s}\right)^{-1}$ … was introduced to us at school, as a *joke* (rightly enough, and in excellent taste)". And I'll confess to always starting von Neumann's construction of the natural numbers with the joke, "What is the difference between the empty set, { }, and {0}, the set with nothing in it?". But I am absolutely sure of the validity and importance of Des's central thesis – that humour is a vital element of mathematics teaching that deserves to be taken seriously. In an age of extreme educational earnestness (where a Poisson distribution question about fish seems to be the nearest that A level examiners get to a joke), I can heartily recommend this delightful compendium which, like its predecessor, not only tickles the fancy, but provides much food for thought.

References

1.   N. Lord, review of *Comic sections*, by Des MacHale, *Math. Gaz*. **78** (July 1994) pp. 205-206.

2.   J. E. Littlewood, *A mathematician's miscellany*, Methuen (1953) p. 79.

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