Boekbesprekingen

| Book Reviews

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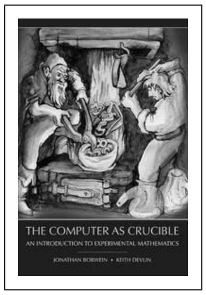


Jonathan Borwein, Keith Devlin
The Computer as Crucible
An Introduction to Experimental Mathematics
A.K. Peters/CRC Press, 2008
200 p., prijs £15.99
ISBN 9781568813431

Met een titel die vrij vertaald 'De computer als vuurproef' betekent, vormt dit boek een lichtvoetige introductie tot 'experimental mathematics' (wat de auteurs precies onder experimentele wiskunde verstaan, wordt gelukkig in hoofdstuk 1 behandeld).

Jonathan Borwein heeft een achtergrond in de analyse en optimalisering, en is al bijna twintig jaar een pleitbezorger van experimentele wiskunde. Keith Devlin, met een achtergrond in de logica en verzamelingenleer, heeft zich de laatste jaren beziggehouden met de manier waarop het menselijk brein wiskunde bedrijft. Zoals ze zelf schrijven: "Borwein was on the inside looking out, and Devlin was on the outside looking in."

De jarenlange praktijkervaring van de beide auteurs laat zich duidelijk zien in de manier waarop ze een aantal problemen beschrijven en de manier waarop die met behulp van de computer zijn opgelost. Zo bieden ze ons inzicht in het vakgebied, inspiratie voor het gebruik van de computer bij wiskundige problemen en af en toe ook een korte geschiedenisles. Bovendien zijn ze erin geslaagd precies de juiste balans te vinden tussen wiskundige diepgang en toegankelijkheid voor een breed publiek.

Het resultaat is een gemakkelijk verteerbaar boek vol humor, voor iedereen met affiniteit voor wiskunde, en een feest van herkenning voor iedereen die ooit de computer gebruikte om een stelling te vinden of te bewijzen.

Dan Roozemond

Anne-Marie Vlasschaert (ed.)
Le Liber mahameleth: Édition critique et commentaires
Franz Steiner Verlag, 2010
Boethius Band 60
613 p., prijs €74
ISBN 9783515092388

Het Boek Mahameleth is rond 1150 in de zuidelijke helft van Spanje geschreven door een christelijke wiskundige. Mahameleth is een Arabisch woord dat (handels)transacties betekent. De anonieme auteur is vermoedelijk in de leer geweest bij islamitische wiskundigen, die hem een groot deel van hun kennis op het gebied van rekenkunde hebben onderwezen. Hij legt deze stof helder uit in goed Latijn, en heeft daarmee een oorspronkelijk wiskundig werk geschreven in een periode waarin anderen zich vooral bezighielden met het vertalen van Arabische teksten in het Latijn.

Het is een interessante vraag wat precies de doelgroep was van het boek. Er staan onderwerpen in die interessant zijn voor een handelaar, zoals het omwisselen van valuta, en het rekenen met het decimale systeem en met een abacus. De meeste opgaven in het boek zijn 'recreational mathematics' en voor de handelspraktijk van geen belang. Een voorbeeld: Een arbeider verdient in 30 dagen een salaris van 30 plus een onbekend getal. In 10 dagen verdient hij het onbekende getal plus de wortel uit 30 plus het onbekende getal. De auteur vindt het onbekende getal (6) door het oplossen van een kwadratische vergelijking. Een ander voorbeeld: verdrijf de wortels uit de noemer van $\frac{10}{\sqrt{6}+\sqrt{7}+\sqrt{8}}$. De oplossing $\frac{10}{143}(\sqrt{200}+\sqrt{486}+\sqrt{343}-\sqrt{1344})$ wordt niet expliciet berekend maar de lezer krijgt alleen te horen hoe hij deze zelf in een aantal stappen kan vinden op basis van Boek 10 van de *Elementen* van Euclides, die als voorkennis bekend worden verondersteld. Deze opgaven waren van het soort waarmee rekenmeesters elkaar in de eeuwen daarna hebben uitgedaagd. *Het Boek Mahameleth* is vermoedelijk een van de oudste Europese handboeken voor rekenmeesters, dat wil zeggen degenen die rekenen onderwezen aan handelaars.

Pas in de jaren tachtig werd *Het Boek Mahameleth* bekend door het werk van de Zwitserse historicus van de wiskunde Jacques Sesiano. Anne-Marie Vlasschaert heeft *Le Liber Mahameleth* nu uitgegeven op basis van alle bewaarde middeleeuws Latijnse handschriften. De Latijnse tekst van 452 pagina's wordt voorafgegaan door een inleiding en een commentaar in het Frans. Op deze manier is *Het Boek Mahameleth* goed toegankelijk gemaakt voor lezers die zowel het Latijn als het Frans machtig zijn. Het werk is van zo grote historische waarde dat volgens het oordeel van uw recensent ook een Engelse vertaling zou moeten worden gepubliceerd.

Jan Hogendijk

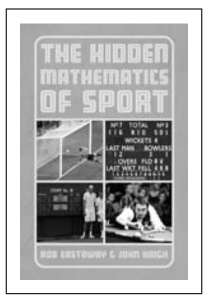
Vincent van der Noort
Getallen zijn je beste vrienden
Ontboezemingen van een nerd
Athenaeum–Polak & Van Gennep, 2011
240 p., prijs €18,95
ISBN 9789025367770

Dit is een alleraardigst boek waarin zo'n twintig wiskundige verhaaltjes staan beschreven. Het boek is vlot geschreven en is zeker toegankelijk vanaf de 4de klas havo, NT-profiel, maar het is eigenlijk prima leesbaar voor iedereen met belangstelling voor wiskunde en niet noodzakelijk met veel kennis van wiskunde. Het begint allemaal simpel, met driehoeksgetallen, kwadraten en Fibonacci-getallen. Maar naarmate het boek vordert, wordt het uitdagender: de symmetriegroepen van Lie, de quaternionen en het vierdimensionale simplex komen voorbij. Het verhaal culmineert in het laatste hoofdstuk, waarin alle elementen bij elkaar komen. De auteur heeft hiermee een voortreffelijke prestatie geleverd: de wiskunde die zeker niet gemakkelijk is, wordt op een heldere en zeer toegankelijke manier gepresenteerd. Van grote kwaliteit in dit boek zijn de figuren, die in al hun simpelheid buitengewoon inzichtelijk zijn. Terecht wordt de illustrator Tammo Jan Dijkema aan het einde van het boek bedankt. Maar het boek kent wel meer lagen. Zo heeft de auteur gekozen voor een opvallende nummering van de hoofdstukken: met hoofdstukken E1 tot en met E8 wordt het 'eigenlijke verhaal' verteld, waarna hij op basis van verschillende thema's uitweidt alsof het boek een kubus is, waarin de E-hoofdstukken de hoekpunten vormen. In die zin lijkt het wel op *The curious incident of the dog in the nighttime* van Mark Haddon, waarin autisme wordt beschreven.

Een laag die er niet is, en die door de titel wel wordt gesuggereerd, is de psychologie. Het begrip 'vriendschap' wordt niet verder beschreven dan de bevriende getallen, dat wil zeggen twee getallen waarvan wederzijds de som van de delers van het ene getal het andere getal oplevert. Ook de ondertitel moeten we maar heel vrij interpreteren als "ik ben een nerd en dit is wat ik aan ontboezemingen heb". Zelf had ik verwacht dat dit allemaal vrijer zou zijn en meer het fenomeen 'wiskundige' zou verklaren — want een beetje een nerd zijn we tenslotte allemaal wel — en dat de vraag naar het 'waarom' van vriendschap naar (of liefde voor) getallen helderder zou worden. Maar dat ontbreekt en mijn psychologie studerende dochter was nauwelijks geïnteresseerd te krijgen. De enige echte ontboezeming vinden we op pagina 78 waarin de auteur beschrijft dat hij met een bepaald spelletje zijn latere vrouw meestal versloeg, die zelf een vriend van de auteur versloeg, die op zijn beurt de auteur weer versloeg. Opvallend is dat deze cirkelstructuur vaker terugkeert, onder andere ook bij Efrons dobbelstenen: een blauwe dobbelsteen met 4 vieren en 2 nullen, een gele dobbelsteen met 6 drieën, een rode dobbelsteen met 2 zessen en 4 tweeën en een groene dobbelsteen met 3 vijven en 3 enen. De eerste speler kiest het eerst een dobbelsteen, daarna de tweede speler. Vermakelijk is dat de tweede speler een dobbelsteen kan kiezen die de eerste speler met een kans 2/3 kan verslaan, welke dobbelsteen de eerste speler ook kiest.

De verdere keuze van de onderwerpen is uiteraard subjectief en richt zich naast de getallen vooral op aspecten van de algebra. Statistiek komt niet voor en ook moderne structuren zoals fractalen en wavelets worden niet besproken. Dat alles vermoedelijk om het boek beperkt, overzichtelijk en samenhangend te houden. Het zij zo, een tweede deel van dit boek is alleen maar wenselijk. De volgende stap zou zijn dat er wat meer formules in voor zouden komen. Hiermee zouden sommige aspecten wat doelmatiger beschreven kunnen worden en daarmee wat sneller toegankelijk worden. De keuze van de auteur om dat niet te doen kunnen we wel respecteren, vooral om het boek laagdrempelig te houden. Het boek bevat referenties die vooral een verbreding geven, maar niet zozeer zorgen voor verdieping. Maar wat is het een zegen om weer eens een oorspronkelijk in het Nederlands geschreven populair wiskundeboek te lezen. Er is uiteraard niets mis met goede vertalingen, maar op de een of andere manier kan een goed wiskundige toch het beste in zijn eigen taal vertellen. De subtiliteiten komen op deze manier verreweg het beste tot zijn recht en sluiten prima aan bij je eigen intuïtie. En ach, misschien is dat wel de sterkste psychologische boodschap.

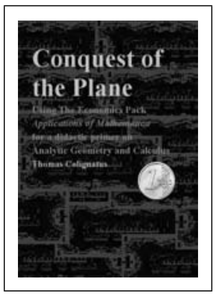
Alfred Stein



Rob Eastaway, John Haigh
The Hidden Mathematics of Sport
Anova Books, 2011
208 p., prijs: £9.99
ISBN 9781907554223

This is a pleasant book to read for all who like sports. It combines amusing anecdotes with historic events. But do not expect to find profound mathematics. Yes, there are indeed mathematics in the book since almost all sporting events deal, one way or the other, with numbers, patterns and logic. The authors have included an occasional formula, elementary statistics or some basic probability theory, but any detail has either been moved to the appendix or, more often, banned from the book. That does not mean that the topics themselves are dull or uninteresting: it is proven easily with vectors that almost any try in rugby is off-side, all goalkeepers in football should use the concept of game theory when confronted with a penalty, and the shape of a ball is, for good reasons, not round. The ways of assessment in jury sports do sometimes (but more often not) influence the final outcome, and the theory of where to hit a ball in snooker is quite different from practice, even when mathematics is taken into account. From these examples, it is also clear that the book has been written from the British perspective. Moreover, there is an overkill of references to sports like cricket or darts. And why not expand a little more on athletics: the difference in length between the staggered lanes in an athletic stadium is easily calculated, but why not show that a straight end of exactly 100 meters is the optimal use of the field? Nevertheless, it is most suitable for a few pleasant hours on a Sunday afternoon with the ears to the radio and the eyes on this book. *Kees Smit*

Thomas Colignatus
Elegance with Substance
Dutch University Press, 2009
112 p., prijs €14,95
ISBN 9789036101387
vrij downloadbaar van www.dataweb.nl/˜cool



Thomas Colignatus
Conquest of the Plane
Cool, T. (Consultancy & Econometrics), 2011
238 p., prijs €24,95
ISBN 9789080477469,
vrij downloadbaar van www.dataweb.nl/∼cool

Elegance with Substance and *Conquest of the Plane* are two books by econometrician Thomas Colignatus, also known as Thomas Cool. In this review I shall refer to the books as EwS and CotP. Both are concerned with mathematics education (at high school level). EwS says that there is a whole lot wrong with how this is presently done, with itemization of fifteen notational disasters, five disasters in nomenclature and four in the standard line of development. The author has proposals for fixing most of these problems, but all in all, this book will come across as somewhat destructive. CotP is then a good antidote: here the author actually gives us a high school mathematics text book in which he attempts to rise to the challenges detailed in EwS. You could call it a 'proof of concept'.

Let me first report the author's claims about his works, and then proceed to discuss my findings on a fairly quick reading of the two books. First of all though I should tell you my conclusion: yes, these works are thought provoking. You will probably not agree with a lot of what the author says. However, teaching mathematics ought to be fun, and it ought to be thought provoking, both for students and teacher. When someone who is something of an outsider to the mathematics community comes up with a carefully and thoughtfully crafted alternative to all the old books and all the old methods, then whether or not the reader agrees with the author, I think he or she can expect to be both stimulated and entertained. I certainly was.

The author claims in EwS that "failure in mathematics and math education can be traced to a deep rooted tradition and culture in mathematics itself. Mathematicians are trained for abstract theory but when they teach then they meet with real life pupils and students. Didactics requires a mindset that is sensitive to empirical observation which is not what mathematicians are basically trained for." And: "While school math should be clear and didactically effective, a closer look shows that it is cumbersome and illogical... What is called mathematics thus is not really mathematics. Pupils and students are psychologically tortured and withheld from proper mathematical insight and competence."

The reader of NAW may find these unfair caricatures. My own opinion is that mathematicians are quite properly trained in what one might disparagingly call 'abstract theory' but can equally well call 'fundamental structures and patterns'. I like very much the philosopher Imre Lakatos' picture of mathematics as driven by empirical research into the structures which we see in our minds, and which reflect what we see in the real world. There have to be some people around in advanced societies who understand logical structures and who are able to operate at a high level of abstraction. Didactics is indeed a different matter. I am fond of the old British saying "those who can, do; those who can't, teach; those who can do neither, teach teachers how to teach". Thus I do not lay failures in mathematics teachers with the training of mathematicians. In fact, in my personal experience, the school teachers who fired my enthusiasm so much that I later became a mathematician were also teachers whose teaching was highly respected by those of my fellow pupils who later went on to become artists or bankers.

Anyway, this review should not be about my own prejudices. I just make these quotes so that the reader is fore-warned: come to EwS and CotP with a sense of humour.

Let me turn to the more constructive, and in my opinion quite fascinating CotP. The author here works out in detail his ideas for reforming the teaching of elementary calculus, trigonometry and algebra. I will here pick out just calculus. Here is again a quote, now from the introduction to CotP. "Calculus can be developed with algebra and without the use of limits and infinitesimals. Define y/x as the outcome of division and $y//x$ as the procedure of division. Using $y//x$ with x possibly becoming zero will not be paradoxical when the paradoxical part has first been eliminated by algebraic simplification. The Weierstraß epsilon and delta and its Cauchy shorthand with limits are paradoxical since those exclude the zero values that are precisely the values of interest at the point where the limit is taken. Much of calculus might well do without the limit idea and it could be advantageous to see calculus as part of algebra rather than a separate subject. This is not just a didactic observation but an essential refoundation of calculus."

The idea is to define differentiation through algebraic manipulations. We start with a 'known function' f. 'Known' means, a function which we have seen before. At this stage of CotP we have seen polynomials and trigonometric functions, multiplication and division and composition, absolute value and sign function, but no exponentials or logarithms. Trigonometrical functions, by the way, are defined through plane geometry; we are supposed to have a prior intuitive understanding of circles, length, et cetera.

We are also at this stage of the book accustomed to various processes of simplification (reduction) of complicated functions. The author's proposal is to define differentiation by reduction of differential quotients $(f(x+\Delta x)-f(x))/\Delta x$ followed by substitution of $\Delta x = 0$. He insists that this is different both from the 'official' epsilon-delta definition and from an approach using infinitesimals. More importantly, he argues that this is a definition which you can give at high school level, thus giving a glimpse of the wholeness and beauty and logical rigour of mathematics: contrast with the hand-waving stories of approximating tangent lines to curves!

This could indeed be a valid definition on the presently stated domain. It certainly reproduces the 'usual' derivative there, though already Cool needs more than just reduction and substitution in order to differentiate the trigonometric functions. In fact, he silently invokes a new principle to deal with them: if a given function is bounded from above and from below by two other functions, all three passing through the same point, and the two bounding functions have the same derivative at that point, then the given function has the same derivative at that point as the two bounding functions.

To pull off this trick on the trigonometrical functions he needs some more geometric insight as well as algebra.

Most high school pupils are not going to ask the two questions: (1) Will I have to go on inventing new tricks every time I meet some new class of functions? And, (2) Is there any guarantee that the result is going to be self-consistent? Most pupils trust their teachers and cannot conceive of functions different in nature from what they have seen so far: explicit recipes for piecewise smooth functions. They are living in the mid 19th century, even if their teachers have paid lip-service to late 19th and early 20th century set-theoretic concepts of function.

But readers of his book who are already professional mathematicians might well ask themselves those questions. On a little thought we will realise that we do know that the answers to questions (1) and (2) are essentially 'No' and 'Yes', respectively. But that is because we already know that so far Cool's derivative coincides with the usual epsilon-delta derivative, where the latter exists. His sandwich trick now deals with all new functions, as long as they are twice differentiable at the point in question, using second order Taylor series to sandwich them locally, in the way which worked for differentiating the sine function. The same sandwich trick also shows that the result will always coincide with the usual derivative. I already mentioned that I suspect that as far as high school pupils are concerned, all functions (or all functions of interest) are piecewise smooth.

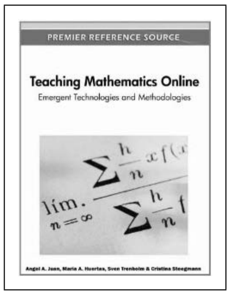
Later Cool defines the exponential function as being the unique function equal to its derivative (up to a constant factor), calling informally on Brouwer's fixed-point theorem to justify its existence. However his presently available function space is already infinite dimensional, so the existence remains an intuitive matter only. The definition is amusing, but it makes me wonder if it is possible to reproduce all of standard high school calculus in a completely rigorous way without making use at all of epsilon-delta mathematics, just using algebra instead (perhaps together with some basic intuitive geometry). Has this been done before? If not, is it in principle possible?

Before set theory, which led to a 'modern' notion of function as being an abstract set of ordered pairs (the graph of the function), mathematicians thought of a function as being some kind of formula: a procedure or recipe. Just as the derivative might, in a parallel universe, have come to be officially defined through infinitesimals, if only our conceptualization of the number line had taken an alternative route, could not differentiation, in yet another parallel universe, have been defined through applying algebraic operations to a convenient class of 'known functions', and only extended to larger classes of functions later, if and when required? After all, we can add rational numbers before we learn to add real numbers. So, I do not have a principled objection to Cool's approach. Whether or not it would work in the classroom is not for me to judge, but it seems to me that there is a lot of sense, in imitating the historical development of mathematics as one passes through subsequent phases of teaching mathematics to children and young adults. I am reminded of philosopher and historian of mathematics Imre Lakatos' studies of the history of the calculus, in which he argues that it is largely by historical coincidence that our present-day 'official' calculus took on the form it did. Some famous elementary mistakes by Cauchy and others were not mistakes if seen in the light of the then insufficiently formalized notions of number and function; they would have been correct theorems (according to Lakatos) if history had embraced non-standard calculus before standard, in other words, had formalized those notions differently. I have been brain-washed by my mathematics education to think that mathematics is about sets, but younger mathematicians tell me that this is limiting my imagination. It's about categories. I wonder if present day barriers in mathematical physics to establishing some clearly fruitful structural categories (speaking loosely) are merely an indication that wanting to see everything as a set is starting to be a hindrance, not a help? We need a formalism which legitimizes the formal manipulations which give the right answers (in physics, we have nature as ultimate authority). We need freedom from contradictions and inclusion of existing formalisms.

Could history have managed — for quite a while longer — with restricting calculus to what can be got with algebra and geometry alone? That might only be a fantasy, but still I find it an interesting fantasy. One thing I do object to in standard high school mathematics education is its tendency to adhere slavishly to the dogma of the day, which leads to a conservatism and dogmatism concerning how mathematics has to be done on the part of cautious souls who need to feel safe, including the less gifted teachers of mathematics. 'Die Wissenschaft von Heute ist das Irrtum von Morgen.' Mathematicians tend to think their discipline is immune to this phenomenon. That, if anything, is the culture of mathematics which I think is wrong in high school teaching. In my experience we learn by mistakes, we need to learn to discard ideas as we grow out of them, in mathematics as elsewhere. And mathematics is wonderfully alive and growing dynamically today; it is not frozen and engraved on tablets of stone. This is what is wrong in present day school mathematics education: no sense of wonder, no amazement, no notion that mathematics is a living part of living science. Just a tool to calculate how many rolls of wallpaper to buy when furnishing a new apartment. A necessary nuisance for future entrepreneurs and managers in the 'kennis, kunde, kassa' society. (This is the present Dutch government's sickening slogan on science policy: knowledge, skills, cash. No wonder the country is going through a crisis of identity.) Thomas' book could give school children a bit of that wonder back again, through his own reinvention of elementary calculus.

Finally I turn to my only big complaint with CotP, and it is quite petty, namely the author's choice of a Mathematica package as companion to his books. Surely, the Sage project (www.sagemath.org) has developed far enough to be able to support everything which Cool does. His ideas will only be taken on board when interested school teachers are able to try things out for themselves and their pupils. I doubt that most schools have a budget to allow all staff and students access to Mathematica. And what about the Third World? Now, Cool has worked a long time on developing Mathematica packages for teaching economics and clearly Mathematica has strongly influenced his thoughts on mathematics and teaching mathematics. And one can see this again as a 'proof of concept', namely to integrate teaching of mathematics with computer algebra, which again seems to me to be a sensible aim. In my own university teaching of probability and statistics (to mathematicians) I do my best to integrate the mathematics with the practice through use of professional but free computer tools (R, www.R-project.org).

So while talking about free software ('free', both as in free lunch and in free speech), wouldn't it be beautiful if Cool would also create a free web-based version of CotP so that other authors can more easily build on his attempts? Let us see half a dozen alternative CotP's. Take the writing and distribution of mathematics texts for schools back from the publishing houses, and give them back to the teachers and students themselves. I suspect the author is not going to do this, but maybe one of his readers will take this next step. *Richard Gill*



Angel A. Juan, Maria A. Huertas, Sven Trenholm, Cristina Steegmann (eds.)
Teaching Mathematics Online Emerging Technologies and Methodologies
IGI Global, 2012
414 p., prijs $ 195.00
ISBN 9781609608750

In this voluminous book, the editors bring together eighteen papers on e-learning of mathematics. They do so, for the following two main reasons. We quote: "to provide insight and understanding into practical pedagogical and methodological issues related to mathematics e-learning, and to provide insight and understanding into current and future trends regarding how mathematics instruction is being facilitated and leveraged with web-based and other emerging technologies."

The book contains a variety of papers, addressing many interesting developments within the area of technology enhanced learning of mathematics. It contains chapters discussing best practices regarding mathematics e-learning in higher education, chapters providing theoretical or applied pedagogical models in mathematics e-learning, chapters describing emerging technologies and mathematical software used in online teaching of mathematics, as well as chapters presenting up-to-date research on how mathematics education is changing by the use of online teaching methods.

The book starts with an introduction by the editors. They give an overview of the various chapters, which they have grouped into the following three sections: 'Blended Experiences in Mathematics e-Learning', 'Pure Online Experiences in Mathematics e-Learning' and 'Mathematics Software & Web Resources for Mathematics e-Learning'.

The chapters are equally divided over the three sections. We briefly summarize the content of the various sections and chapters.

The first section focuses on experiences in mathematical e-learning in which face-to-face teaching is mixed with distance or online instruction. It starts with a chapter by T.K. Miller describing a successful implementation of an asynchronous model for online discussions in a mathematics course for mathematics teachers. The section continues with a chapter by B. Abramovitz et al. on a blended experience in calculus courses for undergraduate engineering students, in which online assessments are used to help students understand theoretical concepts and theorems, followed by a chapter by B. Loch in which she describes how screencasts of live lectures as well as screencasts of short snippets of theory or examples have been used within an Operations Research course to supply online students with just-in-time information. The chapters 4 (G. Albano), 5 (D.S. Perdue) and 6 (B. Divjak) discuss some experiences using general e-learning tools, ranging from LMS (Learning Management System), wikis and speaking avatars to video and social media, to enhance their face-to-face math courses.

The second section of the book is devoted to experiences with purely online e-learning of mathematics. It contains two chapters on the use of online communication and collaboration tools by M. Meletiou-Mavrotheris and by J. Silverman and E.L. Clay, both focusing on the education of math teachers, and two chapters on the use and impact of online teaching material in bridging courses in mathematics for the transition from high school to university, by D.T. Tempelaar et al. and by R. Biehler et al. The other two chapters, by D.H. Jarvis and by S. Trenholm et al. both identify, review and evaluate a number of models and methods of e-learning in mathematics.

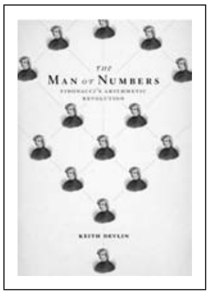
The final section of the book is concerned with mathematical software and web resources for the e-learning of mathematics. It contains a chapter by B. Cherkas and R.M. Welder reviewing some popular websites, a chapter by J.G. Alcázar et al. describing experiences with the software packages WIRIS, GeoGebra, SAGE and Wolfram Alpha, and a chapter by M. Lokar et al. describing the NAUK.si initiative to create web-based learning blocks. M. Badger and C.J. Sangwin discuss the use of Gröbner basis techniques in the automatic grading of online exercises involving systems of equations. M. Misfeldt and A. Sanne discuss the problems that both students and teachers face when writing math formulas in a computer as well as some solutions to these problems. The last chapter by C. Mac an Bhaird and A. O'Shea reviews a number of general purpose software tools to be used in math classes, including podcast, screencasts and videos.

With this book the editors have indeed succeeded to reach their goals. They have brought together a great variety of interesting information about online web resources and their use in both blended and online teaching of mathematics. This collection of papers provides good insight into teaching methods, trends and possibilities offered by technology enhanced learning of mathematics. Math educators will certainly find both information and motivation in several chapters to improve their teaching through good use of technology and online resources.
Hans Cuypers

Recent verschenen publicaties. Als u een van deze boeken wilt bespreken of als u suggesties heeft voor andere boeken voor deze rubriek, laat dit dan per e-mail weten aan reviews@nieuwarchief.nl.

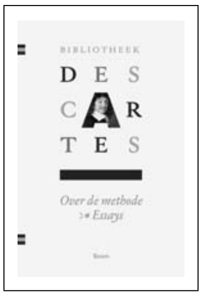
John MacCormick
Nine Algorithms That Changed the Future: The Ingenious Ideas That Drive Today's Computers
Princeton University Press, 2011
ISBN 9780691147147
press.princeton.edu/titles/9528.html

William J. Cook
In Pursuit of the Traveling Salesman: Mathematics at the Limits of Computation
Princeton University Press, 2011
ISBN 9781400839599
press.princeton.edu/titles/9531.html



Keith Devlin
The Man of Numbers: Fibonacci's Arithmetic Revolution
Bloomsbury Publishing, 2011
ISBN 9781408815762
www.bloomsbury.com/Man-of-Numbers/trade/details/9781408815762

Aad Goddijn
De ster van de dag gaat op en onder
Epsilon Uitgaven, 2012
ISBN 9789050411295
www.epsilon-uitgaven.nl/Z34.php



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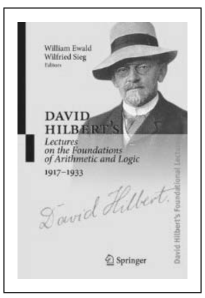

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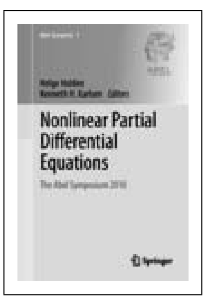

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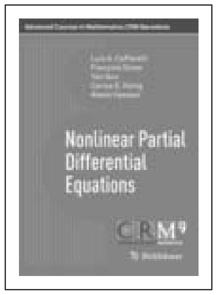

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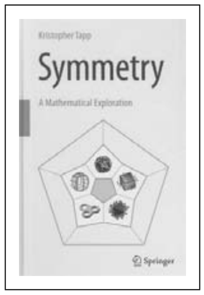

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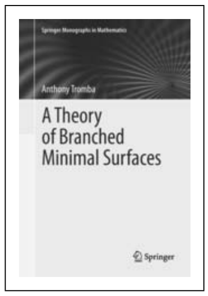

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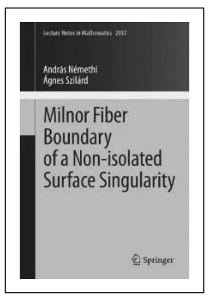

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