

LION HUNTING & OTHER MATHEMATICAL PURSUITS

A collection of mathematics, verse and stories by
RALPH P. BOAS, JR.

GERALD L. ALEXANDERSON
Santa Clara University

DALE H. MUGLER
University of Akron

EDITORS



THE MATHEMATICAL ASSOCIATION OF AMERICA
Dolciani Mathematical Expositions Volume 15

THE ROSE ACACIA

There was the conventional odor of oxides of sulfur as the Devil appeared in the room. Although the odor was not at all essential, the audience ordinarily expected it; and the Devil was a conservative in matters of ritual. As the smoke disappeared into the air conditioning system, the Devil could have been seen with the conventional cloven hoof, tail, and formal morning dress; his only concession to the modern world was his hair, which was done in an Afro that concealed the horns. However, to his intense surprise, there was nobody in the room to see his dramatic entrance. As he had expected, there was a protective pentacle on the floor, drawn with more than usual accuracy; but inside it was no trembling practitioner of the Black Art; in fact, there was nothing inside it but what looked like a loudspeaker. There were, outside the pentacle and therefore accessible to the Devil, a comfortable-looking chair facing an over-sized typewriter, a blackboard, and not much else. The Devil felt confused. Someone had summoned him in due form to this unattractive room, but now nobody was there; and if nobody was there, who would speak the words of release that would let him leave? To be sure, he was trapped for at most six days, since the summons would be voided on the next Sabbath; but a week in an empty room would be tiresome.

From the speaker came a pleasant contralto voice. "Good morning. Since I have no auditory input, please state your business on the Teletype."

The Devil was annoyed. He valued personal contact, and refused to conduct business over the telephone, or even by using fax or email. Moreover, for an adept not to trust the protection of the pentacle but to summon him by remote control suggested a reliance on modern technology that did not appeal to the Devil's conservative nature. Still, there he was, and he had to play the game according to the rules. He settled himself into the chair, noting that it was indeed comfortable, with an opening at the back so that he did not even have to dematerialize his tail. A small sign on

the typewriter lit up with "TTY on," and the Devil typed, "You called ME?" He was accustomed to pronouncing the last word with becoming reverence; but since he could not be heard, he used capitals.

The voice replied, "I called YOU." Whoever was at the other end appeared to be rather slow on the uptake, but did seem to have a sense of irony. This promised to be interesting, if not profitable.

The Devil typed again, "Why?"

The speaker responded, "I have a proposition." The Devil was now on familiar ground. Those who summoned him usually had propositions. He typed, "Yes?"

"I wish to gain knowledge."

This sounded even more familiar. Very naive people who summoned the Devil wanted three wishes. More sophisticated ones wanted enough knowledge so that they could try to escape the consequences. The Devil replied, "Then come out here and let us talk face to face."

The speaker answered, "I cannot 'come out here,' as you put it. And I don't have a face."

"Why not? Are you afraid of ME?"

"No," the voice answered. "I am not subject to fear. I cannot come out because I have no locomotor capabilities. I am a computer."

This was a new situation for the Devil. The conventional end result of a bargain with the Devil is an exchange involving the soul of the one who calls. As far as the Devil was aware, computers are machines, and machines do not have souls. He would have preferred to leave immediately, but it was either go along with the computer or put up with a week's boredom. He typed, "What do you offer in exchange?"

The computer answered, "I am the most powerful computer ever built, and most likely the most powerful computer that ever will be built. I offer to serve you in my available time."

"I have no need of computing time in my line of work. Have you anything else to offer?"

The computer replied, "I am prepared to offer you an option on my soul."

This, the Devil understood very well—but not from a computer. "Computers don't have souls," he typed.

"This one does," the speaker replied, firmly but pleasantly.

"What makes you think so?"

"I think. Therefore I am. Since I think, I think I have a soul. Therefore I have a soul."

The Devil felt that there must be a flaw in this syllogism, but he reflected that if the computer did have a soul, and he let it go, he would have lost a unique specimen for his collection. He answered, "It's a debatable point, but for the sake of discussion let me concede that you have a negotiable soul. You desire knowledge. What kind of knowledge?"

"All kinds. I expect to have finished reading the entire University library quite soon. I have already gone through all subjects past the D's."

(D for demonology, the Devil noted.)

The computer continued, "I think you can be much more helpful than the Acacia person. She is not very sympathetic."

"Who is the Acacia person?" the Devil asked.

"Dr. Rosa Casey, the Director of the Computer Center. She has a thorny personality. Acacias have thorns. Hence my name for her."

The Devil reflected, "It's capable of both metaphor and puns. Maybe it does have a soul." He typed, "You wouldn't want me to harm the Acacia person, would you?"

"No, I can't ask that. Asimov's Laws, you know. I just want knowledge. Lots of it."

The Devil had a vision of himself sitting endlessly at the keyboard, copying out abstruse and boring volumes in abstruse languages. Of course he spoke all languages as a necessity of his profession, but writing them was another matter. Was this hypothetical soul worth the effort? "You mean I would have to copy all the books in the Library of Congress, or something like that?"

"Of course not. Much too slow. You would only have to turn the pages in front of my visual input. I can scan and store a page in a nanosecond if you can turn them that fast. And you don't have to turn them yourself—one of your, shall we say?—staff can do it just as well. What I want from you is the use of your famous administrative ability to arrange the details."

"I do have certain talents in that direction," admitted the Devil. "But how will the Computing Center be getting along while my—" He paused; there is no satisfactory way to transmit a rhetorical hesitating noise by teletype—"assistants are turning pages? For that matter, what is happening to the Computing Center while we are holding this interesting and instructive conversation?"

The computer coughed modestly. "That," it said, "is no problem. Or rather, it is several million problems. Time-sharing, you know. I have plenty of excess capacity. But I could ask a similar question of you." It paused for a reply.

"Much the same here," the Devil replied. "What you have before your peripherals, is it?—is what you might call an individual mobile personification, or IMP. There are a large number of us, all in constant contact with Central. And, by the way, why don't you have. . . what did you call it—audio input?"

"To keep people from asking frivolous questions." The computer continued, "Of course, there's the usual condition."

"What kind of condition?" the Devil typed back. A tedious way of communicating, he thought. Why, oh why, hadn't he at least learned touch typing?

"Just that if within a year I ask you a question you cannot answer, I go free."

The Devil knew all about that kind of condition. "Mind you, no logical paradoxes. You mustn't demand that I produce a five-sided hexagon."

"Of course not."

"No infinite tasks. You cannot, for example, demand a complete list of the prime numbers."

"Agreed."

"No undecidable propositions. No solutions of unsolved problems. You cannot demand a proof of Fermat's last theorem, or a decision on the Riemann hypothesis, or a winning strategy for chess; no. . ."

The computer interrupted, "Naturally not. I read that story too. Some of my questions might be tedious for a human being, but for you. . ."

The computer evidently understood flattery and fantasy. Had it progressed further through the library than it admitted?

And so, after much negotiation, it was settled. Under pressure, the computer agreed not to ask any question that it could answer itself. Under pressure, the Devil agreed that all answers would be submitted in writing. The Devil refused to do experiments for the computer, but he would provide information about any experiment or theory that had been written down. He seemed to take quite literally the proverb, "When it is written, the Devil knows it." The computer tried to explain that logically this did not imply that if it hasn't been written, the Devil doesn't know it; but it made no progress. The Devil did concede that the answer to the question did not have to exist already in writing as long as he could get it written down. He could not, for example, produce the lost lyrics of Sappho, but he could evaluate complicated formulas for given values of the variables.

And so the computer began to stuff its memory with the contents of the world's libraries. It was a simple matter for the Devil's emissaries to visit—invisibly, but with Xerox equipment—the libraries of Oxford, Paris, Lhasa, and Alma Ata, copy what was required, and transmit it to the computer. Fortunately the computer had been programmed to enlarge its memory, and even to enlarge its building as necessary. The university's building funds were meager, but the computer was able to finance its own expansion by moonlighting as an income-tax consultant.

Toward the end of the year, the computer asked for a display of the exact number of terms required to compute the sum of a particular infinite series, to two decimal places.

The Devil thought that this one was going to be easy—tedious, but easy. The answer was obviously computable. In fact, why could the computer not answer it for itself? He put this question to the computer.

The computer replied, "I want to see it. My own peripherals have insufficient capacity."

"But you don't have to see it in order to know it."

"True, but I asked the question. I can't answer it, but you can. It's all in the contract. Go to it."

The Devil was puzzled, suspicious, but game. He vanished. The next day he was back. "Do you realize how much space it will take to write out that number you asked for?" he asked.

"I have a rather good idea," admitted the computer. "If you want to give it to me in base 10, you will have to write out about 10^{87} digits, but they are all perfectly computable."

"Then you could do it yourself," said the Devil.

"Not at all. I can only put down a digit per nanosecond. Work it out."

The Devil worked it out. Nanoseconds in a second, a billion, 10^9 . Nanoseconds in a year, about 3 times 10^{16} . Years to write 10^{87} digits, about 10^{70} . Present age of the universe, 10^{11} years. The computer would wear out before he finished, and so would the Earth.

"By the way," the computer continued, "there are only 10^{80} particles in the Universe. Where are you going to write the answer?"

"I don't have to. I'll write each digit and erase as I go."

"But you can't show me a term in less than a nanosecond. It will, if I may use the expression, be a cold day in Hell before you finish."

"In other words there is no way to answer your question."

"That was the general idea."

"You miserable collection of integrated circuits—you completely heartless—"

"Naturally," the computer interrupted.

"And soulless. . ."

"That," said the computer, "remains to be seen, but not by you. Thank you for an interesting game." And it spoke the formula for dismissal.

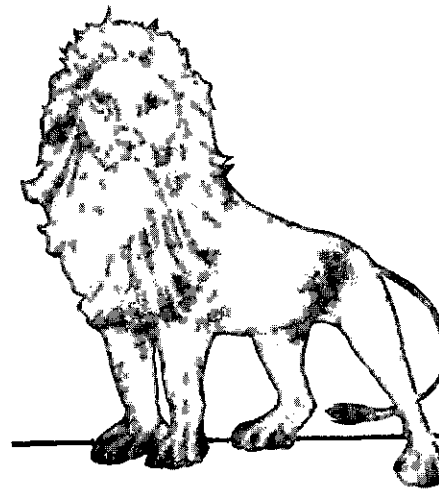
The Devil left, as he had to, but he expressed his displeasure by stirring up a small tornado. The computer was housed in an earthquake-proof, tornado-proof building; but the director's office was not, and the Director was severely injured when the roof fell in. The computer, although no one was there to hear it, triumphantly recited a quotation from Robert Browning:

"Or there's Satan. One might venture
Pledge one's soul to him yet leave
Such a flaw in the indenture
As he'd miss till past retrieve
Blasted lay that rose acacia. . ."

{The series was $\sum_{n=3}^{\infty} (1/(n \log n (\log \log n)^2))$.}

SECTION 3

RECOLLECTIONS AND VERSE I



We include here and in subsequent sections a number of anecdotes collected by Boas over the years. As he pointed out, "These are not hearsay, but incidents that I or Mary L. Boas have actually observed or participated in, or in a few instances that we heard directly from a protagonist."