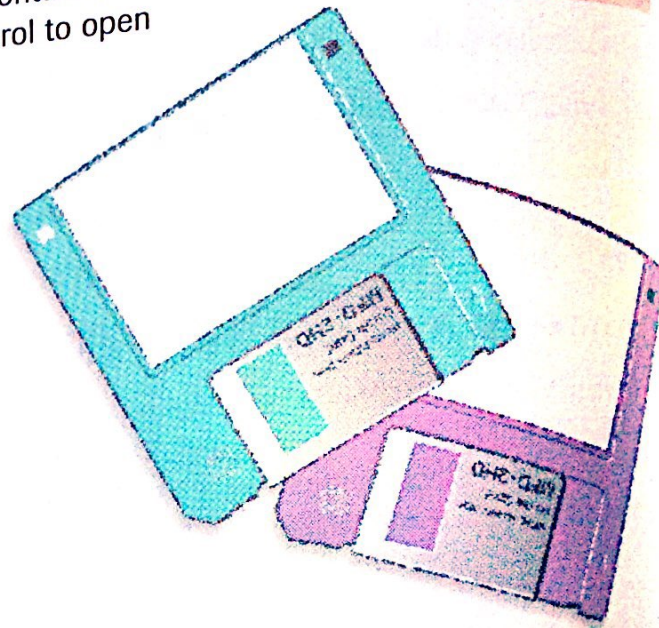


25 PROTECTING COMPUTER FILES

Computer files can be write-protected or read-protected. Carol has access to an application that contains at least 4 read-protected files. When we group half of the write-protected files and all read-protected files, we have no more than 6 files. At most there are 3 more read-protected files than write-protected files. Carol wants to know the contents of each file. It takes 30 s to open a write-protected file and 120 s to open a read-protected file. How many files of each type must the application contain to minimize the time it will take Carol to open them?



The concept of optimization is recent. In fact, it is only since 1947 that we have developed the methods for solving this type of problem. Computers are currently used to solve optimization problems consisting of a large number of inequalities and variables.



26 AYE, AYE, CAPTAIN!

Isabel is an apprentice ship's pilot and hopes one day to become a captain. During a one-month on-the-job training session, she must work on a catamaran and a sailboat. The number of hours she works per month on the catamaran exceeds the number of hours she works on the sailboat by at most 40 h. Isabel has to work between 20 h and 40 h a month on the sailboat. The training lasts for a total of 60 to 100 h. On the catamaran, Isabel is paid \$4/h and on the sailboat she earns \$7/h. How must Isabel divide her time if she wishes to maximize her earnings during her training?



27 THE POWER OF SUGGESTION

A group of at least 40 people volunteered to be hypnotized. It is believed that suggestible people are easier to hypnotize than those who are strong-willed. In this group, the number of skeptical people combined with twice the number of suggestible people does not exceed 120. Although there are at least as many suggestible people as there are skeptical people, there are no more than 50 suggestible individuals. If a suggestible person has a 70% chance of being hypnotized and a skeptical person only a 35% chance, how many people of each type are required to hypnotize the maximum number of people?

28 FILLED TO CAPACITY

A rock concert is organized in a stadium that can hold 10 000 people. The tickets were sold in advance via ticket outlets, and at the stadium door on the day of the concert. At least 4000 tickets are sold in advance and a maximum of 3000 tickets can be sold at the stadium door. The number of tickets sold at the door is greater than one quarter of the tickets sold in advance. An advance ticket costs \$18, while a ticket sold at the door costs \$20.

- What is the maximum profit that this concert can yield?
- In this situation, how many tickets were sold in advance via ticket outlets?

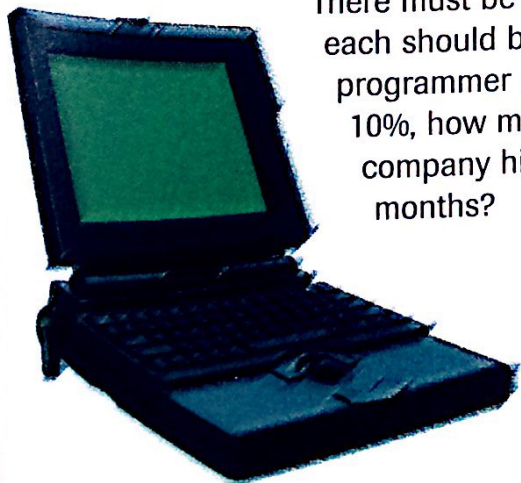


Mick Jagger and the Rolling Stones in concert at Montréal's Olympic Stadium.

29 THE Y2K BUG

In the late 1990s, companies around the world became concerned that their computers were not able to deal with dates in the year 2000. They began hiring consultants to make their computers "Y2K compatible." A company affected by this problem spends at most \$100 000 over a six-month period to hire computer programmers and technicians. The services of a programmer cost \$20 000 for six months and those of a technician, \$10 000.

There must be at least 2 programmers to begin the work and each should be assisted by least 2 technicians. If, in six months, a programmer can do 15% of the work and a technician can do 10%, how many programmers and technicians must the company hire to do as much of the work as possible in 6 months?



The world's first computer, the ENIAC, was invented in 1946 by two U.S. scientists. It was used to calculate rocket trajectories.