

RIDDLES IN FERMAT'S ROOM

OLIVER KNILL

Riddles in Fermat's Room

Fermat's Room is a Spanish detective thriller from 2007. A few mathematicians are lured into a house to solving a great enigma. Inside the house, they are trapped in a room, which is a press crushing them slowly if they do not solve puzzles of the host. The 5 people who are given pseudonyms (Galois, Olivia, Pascal, Hilbert and Fermat) have to solve 6 riddles. While crossing a lake traveling to the house, the first riddle is told. It is not part of the quest inside the house. You find the movie clips here: [http : //www.math.harvard.edu/~knill/various/fermat](http://www.math.harvard.edu/~knill/various/fermat). If you read this document with no solution, there is a second document with solution. But work out first the solutions of course. Otherwise, you will be crushed!

1. RIDDLE

A shepherd has to cross a river with a sheep, a wolf and a cabbage. Only two can go on the boat, for example, the shepherd and the sheep. How can they cross the river without the wolf eating the sheep and or the sheep eating the cabbage?



Solution:

1. Bring sheep
2. Bring back nothing
3. Bring wolf
4. Bring back sheep
5. Bring cabbage
6. Bring back nothing
7. Bring wolf

2. RIDDLE

A sweet seller receives three opaque boxes. One contains mint sweets, another aniseed sweets, another a mixture of mint and aniseed. The boxes have labels, Mint, Aniseed or Mixture but the seller is told that the labels are all wrongly labeled. What is the minimum number of sweets the man has to take out to verify the contents of the boxes?

Solution:

There are 6 permutations. If all are labeled wrong, then there are only 2 rotations left. Opening one box determines the order.

3. RIDDLE

A string of 169 0 and 1's are given.
 $\{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1,$
 $1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 0,$
 $0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0, 1, 1, 1, 1,$
 $0, 0, 0, 1, 1, 1, 1, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 1, 0, 1, 0,$
 $1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1,$
 $1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0\}$. What does it mean?

Solution:

Arrange on a square. A skull appears.

4. RIDDLE

Inside a hermetically sealed room, there is a light bulb and outside the room there are three switches. Only one of the switches lights the bulb. While the door is closed, one can press the switches as often as you want. But when the door is open, you have to say which of the 3 switches lights the bulb.



Solution:

Light one. Then turn it off. Then light the second one. Go into the room. If the light is off and cold, it was the third one.

5. RIDDLE

How can you time 9 minutes using two sand clocks, with one of 4 minutes and the other of 7 minutes?



Solution:

Start both sandclocks. Turn the 4 minute clock 4 times, giving 16 minutes. Start counting after the 7 minutes, when the first sand clock is finished.

6. RIDDLE

A student ask his teacher: how old are your 3 daughters? Teacher: “if you multiply their ages, you get 36. If you add them, you get your house number.” The student protests that it can not be solved. The teacher: “You are right, the oldest plays the piano.” Now the student can answer the question. How old are the daughters?



Solution:

Look at all the products. We have $6*6*1 = 36*1*1 = 18*2*1 = 6*2*3 = 4*3*3 = 9*2*2$ with sums 13,38,21,11,10,13. The sum is ambiguous for $6*6*1$ and $9*2*2$. The last information gives 9,2,2.

7. RIDDLE

In the False land, all the inhabitants always lie. In the True land, all the habitants always tell the truth. A stranger is trapped in a room that has two doors. One door leads to freedom, the other does not. The doors are guarded by a jailer from the False land. The other by from a True land. To find the door of freedom, the stranger can only ask one question but he doesn't know which is from the False land.



Solution:

Ask: "Which door would your colleague tell is the one going to freedom?"