Digital Schoolhouse Puzzle Page

"If I had an hour to solve a problem I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions"

Albert Einstein

Welcome to the Digital Schoolhouse Puzzle Page

On this paper, we will investigate a series of puzzles that can be used to promote Computational Thinking. This month we will investigate the Sock Selection question which has been used by Amazon in interviewing applicants.

Sock Selection

There are 24 socks in a drawer: 12 identical black socks and 12 identical white socks.

If you pick 2 socks at random, what is the probability of getting a matching pair?

Answer: 11/23

The tempting answer is 50%. It would seem you can either make a pair or have a mismatched pair, and that both of those events would have equal chances, making for 50% probability.

But this is wrong! Surprisingly, the answer is less than 50%. It is actually 11/23, which is about 47.80% and slightly less than half!

By symmetry, the probability of making a black pair is the same probability of making a white pair. What is the chance of making a black pair?

For the first sock, there are 12 black socks out of 24 total socks for a 12/24 chance, which is 1/2. After we remove 1 black sock there are 23 remaining socks which 11 are black, and the chances of pick a second black sock is 11/23. The chances of picking two black socks is then (12/24) (11/23) = (1/2) (11/23). The slight asymmetry of 11/23 is because we are sampling without replacement.

The probability of selecting a pair of white socks is also (1/2) (11/23).

The overall chance of making a pair is then:

Pr(pair) = Pr(Black pair) + Pr(White pair)

Pr(pair) = (1/2) (11/23) + (1/2) (11/23)

Pr(pair) = 11/23.

Linkage to Computer Science

The sock selection puzzle provides a simple example of the need to read a question carefully and understand the problem.

Solutions

Puzzle 12: (Hard, difficulty rating 0.66) | Puzzle 11: (Medium, difficulty rating 0.53) | Puzzle 10: (Easy, difficulty rating 0.27)

Puzzle 10: Easy

					9		3	
8	5					9		7
1			3	7	8			
	7			9	3		2	
			7	1	6			
	1		4	8			6	
			2	3	1			8
2		4					7	1
	9		8					

Puzzle 11: Medium

				3		5		4
5			9				8	
		6	2		8	9	7	
8		1			4		3	
	4		8			7		2
	5	8	3		9	4		
	3				6			7
7		4		8				

Puzzle 12: Hard

	1		3					8
2		7						
	3	4			9	5		
1	7	2	8	6				
5								4
				9	5	7	1	6
	6	5				1	7	
						8		3
7					2		6	