UW Math Circle
September 26, 2013

There is a secret hall at Hogwart's with magical closets. When you open a closet door, you might find Harry Potter, who will teach you everything there is to know about magic and wizardry. You could also find Voldemort, who...won't.

Since Hogwart's is a school of magic and wizardry, it is possible that you might find Harry behind every closet door. It is also possible that you could find Voldemort behind every door.

1. When you enter the secret hall, you encounter two closet doors. "One of the signs is true," says Professor Snape, "and the other is false."

I	II
Harry Potter is behind this door. Voldemort is behind the other one.	Harry Potter is behind one of these doors. Voldemort is behind the other.

   Which door should you open?

2. When you enter the secret hall, you encounter two closet doors. "This time, either both signs are true or both signs are false," says Snape.

I	II
Harry Potter is behind at least one of these doors.	Voldemort is behind the other door.

   Which door should you open?

UW Math Circle
September 26, 2013

1. Reid's sock drawer is very disorganized. He has 5 brown socks, 8 white socks, 6 blue socks, 4 polka-dotted socks, and one green sock. If Reid is getting dressed while it is still dark in his room, how many socks must he take from his sock drawer before he can guarantee that he has a pair of matching socks?

2. Flat Stanley has two egg timers. One of the egg timers runs for exactly 7 minutes, and the other runs for exactly 11 minutes. If Stanley cannot use any other time-keeping devices, is it possible for him to boil an egg for exactly 15 minutes?

3. How many four digit numbers are there that do not have any repeated digits?

4. A 5" × 5" cube made of solid wood is painted blue. If you cut the cube into 125 smaller 1" × 1" cubes, how many of these cubes will have exactly two blue faces?

5. Goldilocks enters the home of the three bears – Papa Bear, Mama Bear, and Baby Bear. Each bear is wearing a different colored shirt – red, blue, or green. All the bears look the same to Goldilocks, so she cannot otherwise tell them apart.

   The bears in the red and blue shirts each make one true statement and one false statement:

   The bear in the red shirt says: "I'm Blue's dad. I'm Green's daughter."

   The bear in the blue shirt says: "Red and Green are of opposite gender. Red and Green are my parents."

   Help Goldilocks find out which bear is wearing which shirt.