**Please excuse my lack of Formula Knowledge. It’s been a while since I’ve been in an Algebra class, and Probability is a little fuzzy.**

**Problem 1: A Cat, A Parrot, and a Bag of seed**

**Problem Definition –** A man needs to transport a cat, a parrot, and a bag of seed across a river without anyone eating their counterpart.

**Breakdown**

1. Constraints – Man can only carry one item other than himself.
2. Cat will eat the bird if left together
3. Bird with eat the seed if left together

**Potential Solutions**

1. Take the bird across the river
2. Come back and get the cat
3. Take the cat across the river, and swap it for the bird
4. Return with the bird and swap for the seed
5. Take the seed across the river, and leave it with the cat
6. Return to get the bird, and take it across the river

**Evaluation**

The one solution solves all of the constraints.

**Solution Chosen**

Man takes the bird across the river and leaves the bird on the other side. The man then returns with an empty boat. The man then takes the cat across the river, and returns with the bird. Once on the other side the man swaps the bird for seed and returns to the other side. He returns with an empty boat for a second time to pick up the bird. The man finishes by taking the bird across the river.

Neither the Bird and the seed or the Cat and the Bird are left alone on one side of the river.

**Problem 2: Socks in the Dark**

**Problem Definition –**

24 socks are in a draw; 5 pairs of black, 5 pairs of brown, and 2 pairs of white; 24 socks total. What is the smallest number of socks you would need to select before having?

1 at least one matching pair

2 at least one matching pair of each color

**Breakdown**

10 black socks

10 brown socks

4 white socks

24 socks total

**Potential Solutions**

By the pigeonhole principle you would only have to select four socks to get one matching pair.

The minimum amount of socks you would have to draw to have a matching pair of each color would be six. Though the probability of drawing a pair of each color would be very low, you would at least have to have six socks drawn to have a pair of each color.

**Evaluation**

The pigeonhole principle makes the first solution rather simple. The second answer is pretty much common sense; you would have to at least have six socks drawn to have three pairs. However the probability of this happening is on the low end. You could theoretically pull ten black or brown socks in a row.

**Solution Chosen**

From what little I remember about probability I know that the pigeonhole principle accurately explains how many socks that you would have to choose in order to at least have one pair. I do not remember enough about probability to tell you anything more than you would have to have at least six pairs of socks in order to have one matching set of each color. The probability of this happening is very low, but six is the minimum amount of six you would need to draw.

**Problem 3: Predicting Fingers**

**Problem Definition –**

Little girl counts on her fingers. She starts on her thumb, and reverses direction after counting her pinky. What finger will she end on if she counts:

1-10

1-100

1-1000

**Breakdown**

Every count of 10 ends up on the ring finger

Every count of 20 ends up on the ring finger

Every count of 40 ends up on the index finger

Every count of 100 ends up on the ring finger

**Potential Solutions**

**Evaluation**

If you know that every count of forty would end up on the index finger that means every multiple of forty would as well. It goes for the ring finger and the count of 100

**Solution Chosen**

I chose to count to fifty following the pattern of the little girl. I found that for every multiple of forty I would end up on my index finger. The pattern would then repeat itself all the way to the count of eighty. By count 100 the finger I was selecting was my ring finger. The pattern would then reverse for the next hundred counts. By inductive reasoning I would concluded that the girl would end up on the index finger by count 1000.

1 – 10 will end on index finger

1 – 100 will end on ring finger

1 – 1000 will end on the index finger