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Web Programming Fundamentals

Problem Solving

A cat, a parrot and a bag of seed

1-a. A man has a cat a parrot and a bag of seed he must transport across a riverbank in a boat with only enough room to carry himself and one other item. If he leaves the parrot alone with the cat, the cat will eat it. If he leaves the parrot alone with the seed he will eat that.

1-b. Birds can fly. If the water is not too deep he could simply walk across letting the cat have the boat, carrying the seed and letting the bird fly.

1-c. the overall goal is to get yourself and the three items across the riverbank.

2a. the constraints in this problem are the two items that will eat each other, the size of the boat and the mans emotional attachment to these items.

2b. the sub goals are to do this without getting something eaten along the way and to get the items across as quickly as possible.

3. Possible solutions include the one mentioned above and the obvious simply taking the bird across first as the cat will not eat the bird seed.

4-a. Both solutions have a possibility of success. Possible complications such as the water level and the parrot flying away make the solution of taking the parrot first the safest.

4-b. The only solution that works all around is to take the parrot first.

5-a. Taking the parrot on the boat ride first seems the best. If the bird is caged it will not fly away and ensuring the cat is also caged will prevent it from running away as well. Of course caging the animals solves the original problem of eating each other so this is likely not the case. Assuming that the man has enough control over the animals to ensure that they stay where they are meant to will ensure that this solution works.

5-b. Tests could include taking the bird away from the cat and bird seed but not leaving their sight. This will ensure that the bird will not fly off and the cat will not run away when you actually go for the boat ride. Barring any complications of that the solution will work.

Problem 2

1-a. There are ten pairs of socks in a drawer in a dark room. There are five pairs of black, three brown and two white. You must select at least one matching pair and also one pair of each color.

1-b. Some insight I can input from outside of the word problem is that this question assumes that you are not adept at seeing in the dark. Ability to see dark colors vs white can increase probability of selecting the correct pairs. The socks are also already in pairs, therefore selecting the first matching pair is simple.

1-c. one matching pair and one matching pair of each color.

2-a. The constraints in this problem are the darkness and the unequal number of sock pairs.

2-b. The first goal is easily solved by simply grabbing any pair in the drawer. The sub goal is getting one of each pair.

3. The solution to this sub problem is to look for a form of organization of the socks. The best way to ensure a pair of each color is to select first from the far right of the drawer, then the far left and two pairs from directly in the middle of the remaining pairs.

4-a. This solution has the highest possible success rate without turning on a light, taking the drawer into another room or taking every pair of socks.

4-b. This solution would have to be amended depending on the organizational pattern of the socks.

5-a. Select a pair of socks from the far left side of the drawer, then another pair from the far right side. Finally select two pairs from directly in the middle of the remaining pairs of socks which would leave four pairs of black on one side, one pair of white on the other side and three pairs of brown in the middle. This should ensure that the two pairs in the middle you select are one black and one brown.

5-b. One could arrange the drawer in any way they wish and performing this method will almost always guarantee at least one pair of each color.

Problem 3

1-a. A girl is counting on her fingers. She changes the digits by one every time she makes it through each finger in one count. I have to predict which finger she will end on if counting from 1-10, 1-100 and 1-1000.

1-b. If you count far enough you will notice a pattern.

1-c. The overall goal is to predict which finger she will end on by time she gets to 100 and 1000.

2-a. She does not skip any fingers.

2-b. the sub goals are to find the pattern and predict future outcomes.

3. Observe the counting pattern up to 100.

4-a. This solution meets both goals.

4-b. Each solution will work for all cases related to a number divisible by 10.

5-a. Upon counting by this pattern from 1-100 I observe that with the exception of the first set of ten, the tenth finger will always be either the ring or first. The pattern goes as follows: 10= first, 20=ring, 30=ring, 40=first, 50=first etc..

Note\* 100=ring finger, 1000= first finger.