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May 9, 2013

Problem Solving

A Cat, a Parrot & a Bag of Seed

1. Define the problem
   1. In your own words. A cat, a parrot and a bag of seed need to be transported across a river by a gentleman who only has room in his boat for one of these items. He must decide which one will ride in his boat and figure out a way to get the other two across. He is also concerned the cat may eat the goat and the goat may eat the cabbage.
   2. What insight can you offer into the problem that is not immediately visible from the word problem alone? The goat and the cabbage appear to be a distraction by the author because it is unlikely a cat could eat a goat unless the cat in question was a large feline like a tiger or lion. Also, there is nothing that states he can’t make more than one trip.
   3. What is the overall goal? The goal is to transport all three objects across the river without leaving the wrong ones behind.
2. Break the problem apart
   1. What are the constraints? First, there is only room for one object (cat, parrot, seed) in the boat. There is a concern that the cat may eat a goat if left behind. There is another concern that the goat may eat cabbage if left behind.
   2. What are the sub-goals? Prevent the goat and the cabbage from being eaten.
3. Identify potential solutions
   1. For each of the sub-problems you’ve discussed in #2, what is a possible solution? Tie up the goat with something it can’t chew through so it won’t eat the cabbage and transport the cat across the river first. Then return for the parrot. And make a third trip for the seed. Make a fourth trip for the cabbage and release the goat before leaving.
4. Evaluate each potential solution
   1. Does each solution meet the goals? The cat and the goat seem to pose the most issues so securing the goat in order to remove the cat first seems to make the most sense. Transporting the cabbage was not a goal; however, since it seems important to keep it away from the goat, transporting it across the river seems like a viable solution. Although, birds generally like eating seeds so it might make sense to transport the cabbage before the seeds so the parrot won’t get to it while the man is en route for the cabbage.
   2. Will each solution work for ALL cases? Yes.
5. Choose a solution and develop a plan to implement it
   1. Explain the solution in full. First, secure the goat with something he can’t chew through like a chain. Hide the seed from the parrot. Transport the cat across the river first. Return for the parrot. Then collect the cabbage and transport that across the river. Finally, put the seed in the boat, release the goat and make your way across the river with the seed.
   2. Describe some test cases you tried out to make sure it works. I happen to be on vacation with some friends while working on this assignment so this made for great conversation. One friend owns a parrot and made mention that birds like to eat seeds so I decided the bag of seed should be hidden while the cat was being transported and then it should be transported after the parrot and the cabbage were safely transported across the river. The other friend reminded me the goat shouldn’t be tied up indefinitely because that would be animal abuse so I decided the cabbage would have to go, too. Hopefully, the goat will be able to fend for itself. We used salt and pepper shakers, ketchup bottles and sugar packets as visual aids.

Socks in the Dark

1. Define the problem
   1. In your own words. Figure out the likelihood of blindly selecting a matching pair of socks out of 5 black pairs, 3 brown pairs and 2 white pairs.
   2. What insight can you offer into the problem that is not immediately visible from the word problem alone? The statement does not include any information about the texture or length of the socks. We do not have to assume they are the same exact brands or styles. The problem posed does not take into account neurotic people (like me) who match and roll their socks before storing them.
   3. What is the overall goal? To find one matching pair in any color and to find 3 matching pairs of each color.
2. Break the problem apart
   1. What are the constraints? Trying to match socks in the dark.
   2. What are the sub-goals? Trying to match three pairs, one of each color.
3. Identify potential solutions
   1. For each of the sub-problems you’ve discussed in #2, what is a possible solution? Trying to identify differences in texture and length using your sense of touch.
4. Evaluate each potential solution
   1. Does each solution meet the goals? Yes.
   2. Will each solution work for ALL cases? Only if the texture and length of socks are different. Otherwise, the only recourse is removing any matching pairs to reduce the odds for finding the rest of the pairs.
5. Choose a solution and develop a plan to implement it
   1. Explain the solution in full. Use your sense of touch to distinguish differences in texture and length to find a pair. Each time you find a pair, remove it from the drawer so you can improve the odds of finding a matching pair on your next try.
   2. Describe some test cases you tried out to make sure it works. While I did not have 20 pairs of the same colors, I used 20 pairs of sports socks and was able to detect differences in the feel and length to make matching pairs. I only pulled two mismatches.

Predicting Fingers

1. Define the problem
   1. In your own words. A little girl counts to ten on the same hand. Instead of double counting on her pinky, she counts six on her ring finger, ending up at ten on her index finger.
   2. What insight can you offer into the problem that is not immediately visible from the word problem alone? None.
   3. What is the overall goal? To figure out what finger she will end up on if she uses the same technique of not double counting her pinky to count to 100 and to 1000.
2. Break the problem apart
   1. What are the constraints? Not double counting on your pinky.
   2. What are the sub-goals? Figuring out if you land on the same finger counting to 100 and 1000 as you do counting to 10.
3. Identify potential solutions
   1. For each of the sub-problems you’ve discussed in #2, what is a possible solution? Actually counting on your fingers.
4. Evaluate each potential solution
   1. Does each solution meet the goals? Yes.
   2. Will each solution work for ALL cases? Yes.
5. Choose a solution and develop a plan to implement it
   1. Explain the solution in full. I counted to 10 on my fingers and wound up at my index finger. I counted to 20 and wound up on my ring finger. I predicted at 100 I would wind up at my ring finger again.
   2. Describe some test cases you tried out to make sure it works. Then I had three friends (thankfully with a lot of time on their hands – no pun intended) count out to 100 and then 1000, all of who arrived at their ring finger at 100 and 1000.