

Assignment 0

Due: Monday, July 1, 2019 -
10PM 'Getting in the right head
space'

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Typed up answers submitted through git in a designated Assignment 0 Folder. Do NOT use the internet or any outside resources for any of the below questions. All work must be included.

1. How do you explain the meaning of 'left' and 'right' to an extraterrestrial over a phone? You and the alien both speak the same language. You are in different parts of the universe, so that you are out of each other's observation range.

Left and right are English words used to describe the direction of a thing or place. Hold up your hands and look at them. Hide all fingers except your index and thumb. The hand that makes an L is referred to as your left hand. You only have one left hand. Therefore, your other hand is called your right hand. Now with this in mind, if you are asked to take a right turn to enter, say a neighborhood, you know you will have to turn at around a 90 degree angle to the direction of your right hand.

2. How would you find the number of gas stations in the US? In the world? (you can not look up any specific information, but you need yield an accurate answer)

In our biology and environmental classes we have been told that to find the population density you should count the amount of a particular species in a random area and divide it by its size. Similarly, this can be applied to find the number of gas stations in the US without looking at sources such as the Census Bureau. When doing population density we must remember that this is an average and that the average in a city a rural area will be different.

3. You have 3 fruit baskets filled with fruit. All baskets are covered with zero visibility of the fruit inside the baskets. One basket has apples, one basket has oranges and one basket has a mix of both. All baskets are mislabelled. You have only one chance to take a sample from one basket and you are allowed only one fruit. The fruit will be handed to you so there will be no accidental 'touching' of other fruit. How would you figure out which baskets have which fruits?

First, I'd ask the person handing it to me which one is which based on how many people have gotten there's from. Additionally, I would look at what other people have picked from the basket. If a consistent amount got oranges from the first basket and displayed a satisfactory expression, then I'd assume the basket is only oranges. For the oranges and apples I'd just have to keep an attentive and see what the person in front of me selects.

If there is nobody in front of me, no one to ask, and the basket all carry the same amount of fruit, I would lift the baskets up. I'd estimate to myself how much the first basket weighed and compare its weight to the second and third basket. Theoretically, the only apples and only oranges will weight differently. Alternatively, you could shake the three baskets and compare the noise movement of all three. From my experience, the apples are more likely to move around swiftly then the oranges

4. On a rainy summer day, brothers Dylan and Austin spend the day playing games and competing for prizes as their grandfather watches nearby. After winning two chess matches, three straight hands of poker and five rounds of ping-pong, Austin decides to challenge his brother, Dylan, to a final winner-take-all competition. Dylan clears the kitchen table and Austin grabs an old coffee can of quarters that their dad keeps on the counter. The game seems simple as explained by Austin. The brothers take turns placing a quarter flatly on the top of the square kitchen table. Whoever is the first one to not find a space on his turn loses. The loser has to give his brother tonight's dessert. Right before the game begins, Austin arrogantly asks Dylan, "Do you want to go first or second?" Dylan turns to his grandfather for advice. The grandfather knows that Dylan is tired of losing every game to his brother. What does he whisper to Dylan?

Go first because that will ensure that you will have more opportunities to lead and take control of the game. Like in a tic tac toe game, the most strategic way would be for Dylan to put his first coin on the center of the table. Then he will mimic Austin's moves. For instance, if Austin puts his coin in the bottom right corner of the table then Dylan should put his on the bottom left corner of the table. You can try this out

yourself by drawing your own made up sketch of a table and filling it with coins.

5. Following their latest trip, the 13 pirates of the ship, SIGINTIA, gather at their favorite tavern to discuss how to divvy up their plunder of gold coins. After much debate, Captain Code Breaker says, "Argggg, it must be evenly distributed amongst all of us. Argggg." Hence, the captain begins to pass out the coins one by one as each pirate anxiously awaits her reward. However, when the captain gets close to the end of the pile, she realizes there are three extra coins. After a brief silence, one of the pirates says, "I deserve an extra coin because I loaded the ship while the rest of you slept." Another pirate states, "Well, I should have an extra coin because I did all the cooking." Eventually, a brawl ensues over who should get the remaining three coins. The tavern keeper, annoyed by the chaos, kicks out a pirate who has broken a table and who is forced to return her coins. Then the tavern owner yells, "Keep the peace or all of you must go!" The pirates return to their seats and the captain, left with only 12 total pirates, continues to distribute the coins - "one for you," "one for you." Now, as the pile is almost depleted, she realizes that there are five extra coins. Immediately, the pirates again argue over the five extra coins. The captain, fearing that they will be kicked out, grabs the angriest pirate and ushers her out of the tavern with no compensation. With only 11 pirates left, she resumes distribution. As the pile nears depletion, she sees that there won't be any extra coins. The captain breathes a sigh of relief. No arguments occur and everyone goes to bed in peace. If there were less than 1,000 coins, how many did the pirates have to divvy up?

It would have to be 341 coins.

Key information:

13 pirates results in 3 extra coins

12 pirates results in 5 extra coins

11 pirates result in no extra coins

After a series of attempts. You will realize that the key is to look at the multiplicities of 11 and divide them out by 12 to see which one gives you 5 extra coins.

11, 22, 33, 44, 55, 66, 77, 88, 99, 110, 121, 132, 143, 154, 165, 176, 198, 209, 220, 231, 253, 286, 308, 319, 330, 341, 352, 385, 429, 462, 473, 506

Those that have 5 left over when divided by 12: **77, 209, 341, 473**

For instance, $77 - 5 = 72 \rightarrow 72/12 = 6$

DO this process again by dividing by 13

You'll get that $341 - 3 = 338$ $338/13 = 26$

Therefore, the answer is 314. This is the only one that works perfectly when you divide by 11, 12, and 13.

6. Beyond the obvious (Google, Facebook, etc.), what can computer science be used in? How is it useful?

Computer science can be used for in the sciences and for creating music. I remember reading one article from UChicago about a professor using his interest in computer science to create music. Given that I'm passionate about music, I thought this was a fascinating way that illuminates just how broad computer science can be used for.

Comp science is useful because it can give commands to a robot that may be used at a hospital and thus, save thousands of lives.

7. What does it mean to write 'good' code?

Writing good code means being able to write a command without what I call "the wordiness." For instance, writing a page worth of code when you could have written half of it and still get the job done.

8. What is your prior experience in computer science?

My experience in computer science is a bit strange. I was introduced to it in Sophomore year when I took AP Computer Science. The class was hard, especially with no prior experience. The class was practically an independent course. Senior year, I decided to look into HTML, Javascript, and CSS. Both for a Web development school enrichment and for my AP Research year long research project.

How to submit

As mentioned above, assignment should be submitted through Git. Assignment must be converted to PDF first.