….. by Alexe Babira

1.)How many ping pong balls would it take to fill an average-sized school bus? Describe each step in your thought process.

This is a complicated question to answer. One could only make estimates. To be able to come up with estimates however, I would find the dimensions of a school bus first. Let's just assume that the bus is 10 feet tall 32 feet long and 8 feet wide, second we need the dimensions of a ping pong ball which is around 1.58 inches in diameter which results in a 0.79 inch radius. After the initial data is collected we transform the feet to inches 1 foot = 12 inches hence 10x12 = 120, 32x12=384, 8x12=96. We can now calculate the volume of the bus 120*384*96=4 423 680 cubic inches, also calculate the volume of a ping pong ball which is 4/3 * Pi * (0.79) ^3=2.065 cubic inches , divide the total volume of the bus by the volume of a single ball 4 423 680/2.065=2 142 218 balls in a school bus. I think it's important to stress on the fact that this is a very simple approach to solving this problem, to get a more accurate answer you would need to subtract the volume occupied by the internal objects of the bus, such as the seats , bars, the drivers console, the wheel arches if there are any and also consider the fact that the balls leave empty spaces in between each other when stacked together in a volume. A simple experiment that would improve this result would be to gather a set of spherical objects within a rectangular shape of known dimensions, then calculate the total volume of the shape the total volume of the balls and work out in terms of percentage how much percent of the rectangular shape the balls occupy and apply this calculation to our result which may result in say.. a 10 % decrease so around 1 928 000 balls.

2.)Create a liquid layout with HTML, CSS, and Javascript. This layout must support the following resolutions: 1024x768, 1680x1050. Explain why you would use a liquid layout.

Please note that the attached layout is only compatible with current versions of google chrome and mozilla firefox.

I love the idea of liquid layouts simply because it permits me to cram multiple browser windows on my small 15.6 inch laptop screen and still be able to view most of the contents of the websites i have opened.

I would use a liquid layout if I had a website very light on media content, the look of which doesn't rely on banners and images. I think modern browsers do a really good job at handling liquid css and html code but the more content you add the harder it is to keep control of it. Websites where a liquid layout could be used might include: newspaper websites , blogging websites , wiki websites, forum websites or even text based search engines

3)You own a license plate manufacturing company. Write a program that takes a population and determines the simplest pattern that will produce enough unique plates. Since all the plates that match the pattern will be generated, find the pattern that produces the least excess plates. Use a combination of letters (A-Z) and numbers (0-9).

Please note that you will need a java runtime environment to run the application that I submitted

Also note that a number plate like "SDR23" in my case is equal to "S2DR3"

in other words the placement of digits and letters does not matter it only matters how many are there both digits and letters

Bonus)Programmatically create a game of Connect 4™ with one AI-controlled opponent and a human-controlled player.

The game that i made uses minimax search to search for all the possible moves in the game tree. I ported the recursive function that searches the game tree from a c++ implementation and improved on it to prioritize the shorter winning paths, the heuristic (the one that determines the goodness of a move) function however was built from ground up by me, alongside everything else.

Again make sure to have a java runtime evirnoment to be able to run the jar file supplied.