**Special Assignment**  
*due during test One*

**Why/What is this assignment?**
I occasionally give some optional assignment, normally a small reading assignment or a small project when there is school-off-day or half-day off or just some random special day. For example, Rosh Hashanah day if the class time happens to be from 5:00 ~ 6:40, half of the class time will be cut, which is somewhat not good to design a full lecture. An optional assignment may be assigned instead. Not doing this assignment will not affect the course work nor will it be a problem about missing material. On the other hand, doing this assignment will help you to understand more deeply some topics or give you some extra knowledge. On some rare chance, this might be some puzzle/riddle which more or less involves mathematics, logic and creativeness.

**What occasion is it this time?**
- Students will have test next week, I want you to refresh your mind a bit to prepare for the test and avoid being too stressed on the workload of reviewing materials.
- I also want to see how students motivate their thinking, innovativeness to progress in solving this assignment, so that I can design the test, homework more suitable to students.
- Also, this Saturday is Valentine's Day, I dont want my students to be upset about having to prepare for the test on this day and forget something, even though the schedule was posted since the very beginning of the course. I provide this assignment so you can have a bit entertainment on the day. Of course you are allowed and encouraged to work these problems out with your special someone, like, to spend time ;)  Hope it brings fun too.

**How about its score, is it for extra credits?**
Yes, it is for extra credits. Precisely, it will be counted toward your participation credits, which also means it will not affect or conflict your extra credit question in the coming test One. The total credit for this assignment is 10 points. Note that your participation credit is capped at 20, in case you already have some of them.

**Assignment policy**
Finish as many questions as you can. In case there are many students submitting this assignment, which happens all the time, I will pick randomly 10 (or so) of those to reward extra credits. I will grade this assignment myself. For that reason, and also for the pure individual effort purpose of this assignment, I dont want you to share your answers with another student, which will lessen the chance of others, causes unfairness and ruin the meaning of the assignment. Besides, if you use pencil and eraser, make the picture clear.

**Reference** the geometric puzzles in this assignment are related to connectedness of a 2D region
The questions

Let's think about when you were a kid, you going to the beach with someone and playing on the sand, making some small cute tunnels from your place to your friend's; then you pour some water in the tunnel and it runs to your friend's sand palace. If it happens to have another couple nearby playing the same game, you don't want the two tunnels to cross each other.

An example

Sonic and Amy  
Penguin and Hello Kitty

To make things simple, let's denote 1,2,3,... to be the boys, and A,B,C,... to be the girls and they are arranged at particular places. Let's help them build the tunnels in the beach sand, in pairs of 1-A, 2-B, 3-C,... Finishing each playground is worth 1 point.

play 1:  

1 2 A B

play 2:  

1 2 3 A B C

play 3:  

1 2 3 A C B

play 4:  

1 2 3 4 D A B C
special assignment of week 5th

play 5:

1 2 3 4 5  A B C E D

play 6:

1 2 3 4  A B C D

play 7: play inside the rectangle only

play 8,9,10: inside the area and cannot go across the dark sand

Hope you all have fun