CSci 3501 Lab 1
Due Friday Sep 7th by midnight

- All submissions are electronic: by e-mail to dolan118@morris.umn.edu and CC to all lab partners. Please do not delete your e-mail from "Sent mail" or your mailbox until the end of the semester.
- When working on the lab, please comment your work so that it is clear what contributions of each person are.
- At the end of the lab each group should send me the results of their in-class work. Please indicate if this is your final submission. Don't forget to answer all the questions below.
- If your submission at the end of the lab time was not final, please send me(CC to the lab partner(s)) a final copy before the due time. Please use the subject "3501 Lab N", where N is the lab number.
- Frequently you will want to zip an entire subdirectory and send that.

Assignment
30 points
Work in pairs

Design and implement an algorithm for finding all combinations of the first n integers.
Input: n.
Output: all possible combinations of numbers from 1 to n written one combination per line without repetitions (in any order).
Example: input: n = 3. Output:

```
1 2 3
1 3 2
2 1 3
2 3 1
3 1 2
3 2 1
```

Time your program using Java time function (time in milliseconds)

```
long time = System.currentTimeMillis();
```

This give the current time in milliseconds. Measure it before and after printing the output, subtract the two numbers, and print the result.

If you are using another programming language, please time your program with the time function provided by the language or by the system time command.

Make sure to test your program thoroughly, in particular make sure that all the combinations are printed. Figure out how many lines you would have for $n = 4$ and $n = 5$, then check that you are getting the right number of lines (a counter may be useful here so that you don't need to count by hand).

What is the efficiency of your algorithm in the number of printed lines? Give your answer as Big-O, explain how you computed it.

Based on your timing results and on the Big-O approximation please estimate how long your program would run for $n = 15$ and for $n = 20$. Show how you computed the estimate.