Practice Questions for Jan 29, 2019

1. We had two loops shown below on left to set the values $C[n, 0] = C[n, n] = 1$ for $0 \le n \le N$. What is the advantage (if any, other than the code being shorter) of replacing the two loops by one loop as shown on right?

```
for (int i=0; i<=N; i++)          C[0][0] = 1;
    C[i][0] = 1;                  for (int i=1; i<=N; i++)
for (int i=1; i<=N; i++)              C[i][0] = C[i][i] = 1;
    C[i][i] = 1;
```

   (We replaced $C[i, j]$ here by $C[i][j]$ because the latter is the proper way of writing items of a 2-dimensional array or matrix. Also, as a convention, we should start variable names by a lower-case letter, but we will continue to use $C[i][j]$ instead of, say, $c[i][j]$. Likewise, we continue to use N.)

2. We used the following loop to assign values to the remaining $C[i][j]$'s. Rewrite the loop to take advantage of the symmetry-property $C(n, m) = C(n, n - m)$ of $C(n, m)$. (This will reduce the number of addition operations involving the numbers $C[i][j]$ by a factor of 2 approximately.)

```
for (int i=2; i<=N; i++)
    for (int j=1; j<i; j++)
        C[i][j] = C[i-1][j-1] + C[i-1][j];
```

3. Complete the code below for a function `int combination(int n, int m)` for inputs $0 \le m \le n$ to return the value of $C(n, m)$.

```
public static int combination(int n, int m) //assume 0 <= m <= n
{ ...
  ...
  ...
}
```

4. To be added.