Class 10

Nested Loops, Library Functions
Example 1

• Print a 5 x 5 table with a border of * and X everywhere else:

```
*****
*XXX*
*XXX*
*XXX*
*XXX*
*****
```

Questions to ask:

1. How many rows?
2. How many columns?
3. After labeling the rows and columns, what condition(s) using the row and column labels can be used to tell the computer when a particular character needs to be placed?
Example 2

- Print a 6 x 6 checkerboard pattern:

XOXOXO
OXOXOX
XOXOXO
OXOXOX
XOXOXO
OXOXOX
OXOXOX

Questions to ask:

1. How many rows?
2. How many columns?
3. After labeling the rows and columns, what condition(s) using the row and column labels can be used to tell the computer when a particular character needs to be placed?
Example 3

- Print a 6 x 6 multiplication table:

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

Questions to ask:
1. How many rows?
2. How many columns?
3. What action is repeated frequently?
4. What action is repeated less frequently?
Example 4

- Output seven days for each week of three weeks.

Week: 1
  Day: 1
  Day: 2
  ...
Week: 2
  Day: 1
  Day: 2
  ...

Questions to ask:
1. How many rows?
2. How many columns?
3. What action is repeated frequently?
4. What action is repeated less frequently?
Library Functions

- `rand()` generates a random integer
- Use in conjunction with `srand()` to generate a distinct random number every time the code executes
Example 5 – Single For Loop

- Goal: Generate ten random numbers
Example 6

• Generate ten random numbers each between 1 and 10
For Fun

• Number guessing game
  • Generate a random number between 1 and 100
  • Ask the user to guess the number
  • In a while loop:
    • If the user’s guess is too low, print “Too low” to the monitor
    • If the user’s guess is too high, print “Too high” to the monitor
    • Prompt the user for a new guess
  • Once the user guesses the correct number, print “You guessed the number!”
  • If you like, keep track of how many tries it took the user to guess the number