Objectives: Integer arithmetic, Functions, menus.

Write a C++ program that displays the following menu of choices.

```
1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice:
```

For each of the choices (1, 3, 4), Read a **positive** integer number and call a **function** that processes the menu choice (descriptions below). For option 2 read two **positive** integers. If the **n** value is invalid, print an error message and display the menu again. Your program should continuously display the menu until the user enters 5 to quit. Any other choice should be ignored, and the menu should be displayed again.

Required Functions (use the provided prototype and function names):

- Option 1, `int getNumDigits(int number)`:
  Return the number of digits in `number`.

- Option 2, `int getNthDigit(int number, int n)`:
  Return the digit number specified by `n`. Right most digit is digit one.

- Option 3, `int getSumDigits(int number)`:
  Return the total value of all the digits.

- Option 4, `bool isPalindrome(int number)`:
  returns true if the number is a palindrome (1, 121, 1221, 134431, etc.). False otherwise.

- A function (`int getInteger()`) that returns a positive integer. This function should loop until the user enters a positive integer.

All of the above functions must only manipulate integers.

Do not use string types or arrays in any part of this project.

Sample Run (user input in red):

```
1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 0

1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 1
Enter a positive integer: -9
Enter a positive integer: -7
Enter a positive integer: 123

123 has 3 digits.

1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 2

Enter an integer number: 23178149
Enter a position: 4

Digit number 4 is 8.

1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 2

Enter an integer number: 23
Enter a position: 4

Invalid position.
```

```
1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 3
Enter an integer number: 123456789

The sum of all digits in 123456789 is 45.

1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 4
Enter an integer number: 1

The number 1 is a palindrome.

1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 4
Enter an integer number: 12

The number 12 is not a palindrome.

1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 4
Enter an integer number: 1223221

The number 1223221 is a palindrome.

1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 4
Enter an integer number: 1221

The number 1221 is a palindrome.
```

```
1. Find the number of digits in an integer.
2. Find the nth digit in an integer.
3. Find the sum of all digits of an integer.
4. Is the integer a palindrome?
5. Quit
Enter a choice: 5

Done!
```

Hints:

- Start by making the menu and the loop and make sure they are functioning correctly before proceeding to other parts of the program.
- Write function stubs for all the required functions first.
- Implement and test one functions at a time.

Grading:

- **Programs that contain syntax errors will earn zero points.**
- **Programs that do not include the above functions will also earn zero points.**
- **Programs that use arrays, strings, or any other library that was not discussed in class will earn zero points.**

Your grade will be determine using the following criteria:

- Correctness (25 points)
  - 5 points for each of the required functions listed above.
- Runs continuously (4 points)
- Clarity and format of the output (5 points)
- Style & Documentation (6 points)

Follow the coding style outline on GitHub:

https://github.com/nasseef/cs2400/blob/master/docs/coding-style.md