CS111 Homework 4

Name your program **hw4.cpp**. Program must be able to compile or you will get at most 1 out of 2 points for the assignment.

**Due: Monday April 9, 2018 by 11:59 PM**

Write **one single** complete C++ program to do all 3 sections below:

**Part A:**
Display the following present value table. Mention the title "Present Value of $1" before printing the table. Use the `presentVal` function (see details in part B) to calculate the present values from 1% - 10% and period 1 – 10.

**Output:**

<table>
<thead>
<tr>
<th>Periods</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>7%</th>
<th>8%</th>
<th>9%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.9901</td>
<td>0.9804</td>
<td>0.9709</td>
<td>0.9615</td>
<td>0.9524</td>
<td>0.9434</td>
<td>0.9346</td>
<td>0.9259</td>
<td>0.9174</td>
<td>0.9091</td>
</tr>
<tr>
<td>2</td>
<td>0.9803</td>
<td>0.9612</td>
<td>0.9426</td>
<td>0.9246</td>
<td>0.9070</td>
<td>0.8900</td>
<td>0.8734</td>
<td>0.8573</td>
<td>0.8417</td>
<td>0.8264</td>
</tr>
<tr>
<td>3</td>
<td>0.9706</td>
<td>0.9423</td>
<td>0.9151</td>
<td>0.8890</td>
<td>0.8638</td>
<td>0.8396</td>
<td>0.8163</td>
<td>0.7938</td>
<td>0.7722</td>
<td>0.7513</td>
</tr>
<tr>
<td>4</td>
<td>0.9610</td>
<td>0.9238</td>
<td>0.8885</td>
<td>0.8548</td>
<td>0.8227</td>
<td>0.7921</td>
<td>0.7629</td>
<td>0.7350</td>
<td>0.7084</td>
<td>0.6830</td>
</tr>
<tr>
<td>5</td>
<td>0.9515</td>
<td>0.9057</td>
<td>0.8626</td>
<td>0.8219</td>
<td>0.7835</td>
<td>0.7473</td>
<td>0.7130</td>
<td>0.6806</td>
<td>0.6499</td>
<td>0.6209</td>
</tr>
<tr>
<td>6</td>
<td>0.9420</td>
<td>0.8880</td>
<td>0.8375</td>
<td>0.7903</td>
<td>0.7462</td>
<td>0.7050</td>
<td>0.6663</td>
<td>0.6302</td>
<td>0.5963</td>
<td>0.5645</td>
</tr>
<tr>
<td>7</td>
<td>0.9327</td>
<td>0.8706</td>
<td>0.8131</td>
<td>0.7599</td>
<td>0.7107</td>
<td>0.6651</td>
<td>0.6227</td>
<td>0.5835</td>
<td>0.5470</td>
<td>0.5132</td>
</tr>
<tr>
<td>8</td>
<td>0.9235</td>
<td>0.8535</td>
<td>0.7894</td>
<td>0.7307</td>
<td>0.6768</td>
<td>0.6274</td>
<td>0.5820</td>
<td>0.5403</td>
<td>0.5019</td>
<td>0.4665</td>
</tr>
<tr>
<td>9</td>
<td>0.9143</td>
<td>0.8368</td>
<td>0.7664</td>
<td>0.7026</td>
<td>0.6446</td>
<td>0.5919</td>
<td>0.5439</td>
<td>0.5002</td>
<td>0.4604</td>
<td>0.4241</td>
</tr>
<tr>
<td>10</td>
<td>0.9053</td>
<td>0.8203</td>
<td>0.7441</td>
<td>0.6756</td>
<td>0.6139</td>
<td>0.5584</td>
<td>0.5083</td>
<td>0.4632</td>
<td>0.4224</td>
<td>0.3855</td>
</tr>
</tbody>
</table>
Part B: (from p.383 question 10 in Starting Out with C++, 7th ed. with some changes)
Suppose you want to deposit a certain amount of money into a savings account, and then leave it alone to draw interest for the next 10 years. At the end of 10 years you would like to have $10,000 in the account. How much do you need to deposit today to make that happen? To find out you can use the following formula, which is known as the present value formula:

\[ PV = \frac{C_1}{(1 + r)^n} \]

The terms in the formula are as follows:

- \( P \) is the **present value**, or the amount that you need to deposit today.
- \( C_1 \) is the **future value** that you want in the account (in this case, $10,000).
- \( r \) is the **annual interest rate** (expressed in decimal form, such as .042).
- \( n \) is the **number of years** that you plan to let the money sit in the account.

Write a program with a function named `presentVal` that performs this calculation. The function should accept the future value, annual interest rate, and number of years as arguments. It should return the present value, which is the amount that you need to deposit today. Demonstrate the function in a program that lets the user experiment with different values for the formula’s terms.

Note: Do **NOT** use the pow function from `<cmath>` library for calculating the value of \((1 + r)^n\). Rather, think about how to use a loop to accomplish that task inside the `presentVal` function.

**Sample output 1 (red = user’s input):**
Part B:
Enter the amount that you want to save: $1
Enter the annual interest rate (in decimal form, such as .042): .1
Enter the number of years that you plan to keep the money in the account: 1
The amount you need to deposit today is $0.91

**Sample output 2 (red = user’s input):**
Part B:
Enter the amount that you want to save: $1000
Enter the annual interest rate (in decimal form, such as .042): .05
Enter the number of years that you plan to keep the money in the account: 5
The amount you need to deposit today is $783.53
Part C: (from professor Yang with slight modification)

Write the following 3 functions.
(a) A function called `smallerThan7` that checks whether the integer parameter is smaller than 7, return true if it is, return false otherwise.

(b) A function called `rollDice` that returns a random dice value (1-6).

(c) A function called `emphasis` which takes in a string parameter and print that 3 times (i.e. use a loop) to screen. It doesn’t return any value.

In your main function.
1. Use function roll dice three times, to generate 3 dice values. Print each number to screen.
2. Add previous dice values together to a variable called sum. Print out the sum to screen.
3. Use function smallerThan7, to check whether the sum is smaller than 7.
4. Repeat step 1, 2, 3 until the sum is smaller than 7.
5. Use function emphasis, to print out string "Alright! I’m done!" 3 times to screen on the same line.

Sample output 1:
Part C:
Roll dice: 4 2 1 Sum = 7
Roll dice: 6 5 3 Sum = 14
Roll dice: 3 1 2 Sum = 6
Alright! I'm done!Alright! I'm done!Alright! I'm done!

Sample output 2:
Part C:
Roll dice: 4 1 4 Sum = 9
Roll dice: 4 3 5 Sum = 12
Roll dice: 3 2 2 Sum = 7
Roll dice: 6 6 4 Sum = 16
Roll dice: 1 4 6 Sum = 11
Roll dice: 3 5 4 Sum = 12
Roll dice: 4 1 5 Sum = 10
Roll dice: 2 5 4 Sum = 11
Roll dice: 6 5 1 Sum = 12
Roll dice: 4 4 4 Sum = 12
Roll dice: 6 5 4 Sum = 15
Roll dice: 1 2 4 Sum = 7
Roll dice: 6 3 5 Sum = 14
Roll dice: 5 2 2 Sum = 9
Roll dice: 6 6 5 Sum = 17
Roll dice: 6 3 2 Sum = 11
Roll dice: 3 4 2 Sum = 9
Roll dice: 5 5 4 Sum = 14
Roll dice: 1 2 1 Sum = 4
Alright! I'm done!Alright! I'm done!Alright! I'm done!