CS111 Lab exercises (if-else + while + Boolean operators)

Question 1:

i. Declares a variable number of type int.
ii. Prompts user for a positive 4-digits integer.
iii. Tests the input for out of bound cases – larger or smaller than 4 digits using if-else statements.
iv. Calculates and prints the sum of the digits if the input value is valid.
   v. Otherwise, display an error message and terminate the program.

Sample output with user’s input in red:
Please input a 4-digit positive integer: 3321
The sum of all digits in 3321 is 9.

Question 2:

i. Find and print the smallest positive integer n such that n² is greater than 11,000.
ii. Find and print the largest integer n such that n³ is less than 11,000.

Question 3:
The following exercise is taken from p.238 of Starting Out With C++ (7th ed.) by Tony Gaddis with slight modification.

Write a program that calculates and displays a person’s body mass index (BMI). The BMI is often used to determine whether a person with a sedentary lifestyle is overweight or underweight for his or her height. A person’s BMI is calculated with the following formula:

\[ \text{BMI} = \frac{\text{weight} \times 703}{\text{height}^2} \]

where weight is measured in pounds and height is measured in inches. The program should display a message indicating whether the person has optimal weight, is underweight, or is overweight. A sedentary person’s weight is considered to be optimal if his or her BMI is between 18.5 and 25. If the BMI is less than 18.5, the person is considered to be under weight. If the BMI value is greater than 25, the person is considered to be overweight.

Test the inputs for out of bound conditions.

vi. If user enters a height less than 10, print out the following messages and terminate the program.

   Input for height must be 10 inches or more.
   Terminating the program.

   vii. If user enters an invalid weight (i.e. non-positive number), use a while loop and print out the following message until user enters a correct value.

   Please enter a weight greater than 0 lb:
Program output with example input shown in bold:

[ctse@venus ans]$ make hw2_sp17_sol
  g++  hw2_sp17_sol.cpp  -o hw2_sp17_sol
[ctse@venus ans]$ ./hw2_sp17_sol
Body Mass Index Program
What is your height measured in inches?  72
What is your weight measured in pounds?  160
Your BMI is 21.70 and is considered normal.
[ctse@venus ans]$ ./hw2_sp17_sol
Body Mass Index Program
What is your height measured in inches?  60
What is your weight measured in pounds?  160
Your BMI is 31.24 and is considered overweight.
[ctse@venus ans]$ ./hw2_sp17_sol
Body Mass Index Program
What is your height measured in inches?  80
What is your weight measured in pounds?  160
Your BMI is 17.57 and is considered underweight.
[ctse@venus ans]$ ./hw2_sp17_sol
Body Mass Index Program
What is your height measured in inches?  5
Input for height must be 10 inches or more.
Terminating the program.
[ctse@venus ans]$ ./hw2_sp17_sol
Body Mass Index Program
What is your height measured in inches?  72
What is your weight measured in pounds?  -1
Please enter a weight greater than 0 lb: 0
Please enter a weight greater than 0 lb: 100
Your BMI is 13.56 and is considered underweight.