COMP281 Assignment 1 Report

1. **Problem ID: 1013   Title: Record marks**
Solution description:
In this problem, since marks are divided into 3 groups:
1) greater than or equal to 85;
2) between 60 and 84;
3) strictly less than 60,
3 counters are needed to record the number of marks in each group. In my code, these counters are integer variables called 'levelA','levelB' and 'levelC', initialized with 0. Then, keep reading input marks and updating corresponding counters until a '0' is entered. Finally, print out the result in the given format.

2. **Problem ID: 1014   Title: Area and circumference of circles**
Solution description:
Firstly, a constant value 'PI' is defined as 3.14.
After reading user's input, a 'For Loop' is needed to calculate the area and circumference of each circle (radius from 'r1' to 'r2') and add them together. Finally, print out results in the given format.

3. **Problem ID: 1015   Title: ASCII code**
Solution description:
In the 'while' loop, keep reading user's input until it is 'EOF' and print out all the integers in the format "%c", so that they will be converted to characters.

4. **Problem ID: 1025   Title: Largest common factor and smallest common multiple**
Solution description:
To compute the largest common factor of 2 positive integers 'a' and 'b', the main concept of the algorithm is 'Euclidean algorithm'. Its principle is that the largest common factor of two numbers does not change if the large number is replaced by its difference with the smaller number [1]. And a more efficient way is to replace the larger number with the its remainder when divided by the smaller one. This principle is applied in my code in a recursive way.
Another property of largest common factor and smallest common multiple is that: suppose A and B are two positive integers, then A * B = LCF(A, B) * SCM(A, B). Therefore, if we can get the LCF(A, B), then according to the formula, SCM(A, B) = A * B / LCF(A, B).
(note: 'LCF' stands for 'largest common factor' and 'SCM' stands for 'smallest common multiple')

5. **Problem ID: 1030   Title: Precise division**
   Solution description:
   My solution to this problem is basically simulating the process of doing a long division. For example, if input is A=8, B=13, N=5, after doing the process as the figure shows below, we will get the 5-th digit which is 8.

			0.	6	1	5	3	8
1	3	8.	0	0	0	0	0	
	−	0						
		8	0					
	−	7	8					
			2	0				
		−	1	3				
			7	0				
			−	6	5			
				5	0			
				−	3	9		
					1	1	0	
					−	1	0	4
								6

   Detailed steps:
   1. Set A to the remainder of (A / B), if A is greater than B at first;
   2. For each loop, set A to the remainder of (10A / B);
   3. In the N-th loop, which is also the last loop, the quotient part of (10A / B) is the N-th digit.

   Reference:

[1]"Euclidean algorithm", *En.wikipedia.org*, 2020. [Online]. Available: https://en.wikipedia.org/wiki/Euclidean_algorithm. [Accessed: 16- Feb- 2020].