CSO Assignment 1
2019101120 – Arushi Mittal

Problem 2

Results:

For x = 24
Output = 4

For x = 27
Output = 9

For x = 1
Output = 1

For x = 0
Output = 0

For x = 120
Output = 5

Values of x:

8-bit: Overflow occurs when x = 7
16-bit: Overflow occurs when x = 11
32-bit: Overflow occurs when x = 13
64-bit: Overflow occurs when x = 23

Values of i:

8-bit: Overflow occurs when i = 6
16-bit: Overflow occurs when i = 9
32-bit: Overflow occurs when i = 13
64-bit: Overflow occurs when i = 21

The given values of i have factorials that are greater than (2 to the power n) - 1, where n is the number of bits. To calculate the value of x, we find the first value that does not have all its factors in the range of numbers from 1 to max value of i. For example, in 8-bit, x = 6 will not overflow because 3! contains both of the factors of 6. However the factors of 7 are not present in the range 1 to 5, so 7 will give an overflow. Similarly the rest of the values are calculated.