MA1008 Introduction to Computational Thinking
Tutorial Week 5: Program control – loops

This tutorial is on program control, going round loops making repeated computations.

1. Consider the function `range(-4,11)`, which of these values are in the range: -5, -4, -3, 10, 11, 12?

2. Write a program that prints the numbers 1 … 12 all in one line and then 13 … 24 in another line, all using only one `for` loop. Write two versions, with the numbers separated by (i) a space and (ii) a comma.

3. What are printed in Line 1 and Line 2?

```
i = 1
j = 0
while i < 10:
   i += 1
   j += 2*2
print (i)   # Line 1
print (j)   # Line 2
```

4. Assume that `X` has a given value, rewrite the following for loop as a while loop:

```
for i in range(1, X+1):
   if X % i == 0:
      print(i)
```

5. Explain what this program does:

```
sum = 0
while True:
    num = int(input("Enter a number:"))
    if num <= 0:
        break
    else:
        if num%2 == 0:
            continue
        else:
            sum += num
```

6. The following program has a for loop inside a while loop. What are printed?

```
for x in range(10):
    y = x
    while y < 7:
        print(y, end = " ")
        y += 2
        if y > 5:
            break
```

7. Write loops in Python to perform the following mathematical summations:

i. $\sum_{i=1}^{n}(\frac{1}{i}+1)$

ii. $\sum_{i=1}^{n}(i+\sum_{j=0}^{i}j)$

You may assume that *n* is predefined and carries a legitimate value. Don't forget to initialise the sum. You don't need to print the outcome.