

Activities: Module 5 – for loops

1. Use a for loop with various range statements to write programs that print out the following set of numbers on separate lines.
 1. 0, 1, 2, 3, 4, 5
 2. 1, 2, 3, 4, 5
 3. 0, 2, 4, 6, 8, 10 (There are two solutions, one uses multiplication by 2, the other one uses the third argument to range, the step-size.)
 4. 1, 3, 5, 7, 9, 11 (Again, there are two solutions.)
 5. 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
 6. 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0
2. A program that asks the user for a word, then prints out the letters in the word on separate lines. This program uses the `for letter in word:` construction.
3. Programs that calculate and print the following sums. (I give the results in parenthesis.) Recall that we calculate these sums using an accumulator that is initially equal to 0. We then use a for loop such as `for i in range(1, 10001):` for the first sum. Each iteration adds the addends to the accumulator. It is easy to make a mistake. The first parameter of the range is the beginning value, the second value is the stop value, i.e. the value just before which we stop the iterations.

1.
$$\sum_{i=1}^{10000} i^2 = 333383335000.$$

2.
$$\sum_{i=1}^{1000} \frac{1}{1+i^2} = 1.07567.$$

3.
$$\sum_{i=0}^{100} \frac{(-1)^i}{i+1} = 0.693646.$$

4. We can also calculate products, but now the accumulator's initial value has to be 1. Calculate

1.
$$\prod_{\nu=0}^{100} \frac{101-\nu}{1+\nu} = 1$$

2.
$$\prod_{\nu=0}^{100} \frac{1+\nu}{1+\nu^2} = 2.97341 \times 10^{-157}$$