*In this workshop, you'll explore `for` loops and built-in functions in Python. Your workshop leader will guide you through the process. Please **do not** work ahead.*

1 `for` loops

1. Trace the following code fragments and state what the output will be:

   (a)
   ```
   for i in range(5):
       print(i, end=" ")
   ```

   (b)
   ```
   for i in range(1, 5):
       print(i, end=" ")
   ```

   (c)
   ```
   for x in range(3, 20, 2):
       print(x, end=" ")
   ```

   (d)
   ```
   num_iterations = 6
   for i in range(num_iterations):
       print(i, end=" ")
   ```

   (e)
   ```
   num_iterations = 6
   for i in range(1, num_iterations+1):
       print(i, end=" ")
   ```

   (f) Briefly explain how the `range()` function works, including an explanation of the arguments.

   (g) Rewrite the code below to use the `range()` function.

```
for x in [3, 6, 9, 12, 15, 18]:
    print(x, end=" ")
```

(h) Briefly explain why you would use the `range()` function when you could just list the sequence out as was done above.

2. Consider the following code:

```
fave = input("What is your favorite ice cream flavor? ")
for i in range(1, 5):
    print(str(i) + ".", fave, end="     ")
```

(a) What will this program print if a user types `'rocky road'`?

(b) Why is the `str()` function call needed within `print()`?

3. Complete the arguments in the following `range()` function so that the code prints the *even* numbers between 100 and 200, *inclusive*:

```
for i in range(              ):
    print(i)
```

4. Complete the arguments in the following `range()` function so that the code prints `5 4 3 2 1 0`.

```
for i in range(              ):
    print(i)
```

2 Built-in Python functions

5. Circle the calls to built-in Python functions in the code below:

```
# get input
name = input("What is your name? ")
shoe_size = input("What is your shoe size? ")
shoe_size = int(shoe_size)
if shoe_size > 14:
    print("Hello, big foot", name)
elif shoe_size <= 3:
    print("Hello, wee foot", name)
else:
    print("Hello", name)
```

6. What is the result of the following expressions?

   (a) `abs(4.5)`

   (b) `int("678")`

   (c) `round(-5.6)`

   (d)
```
import random
random.randint(4, 10)
```

   (e) For last the code above, what would happen if the line `import random` was omitted?

7. Consider the following code. (You may wish to consult the Python documentation for the 'math' module.)

```
import math
x = 4.7
y = 5.3
z = -4.8
print(math.ceil(x))
print(math.ceil(y))
print(math.ceil(z))
print(math.floor(x))
print(math.floor(y))
print(math.floor(z))
```

   (a) What does the above program print? (You can annotate the code above to show the output.)

   (b) Why are the calls to `floor()` and `ceiling()` prefixed with `math.`? Briefly explain.

8. What does the following program do? Briefly explain.

```
n1 = int(input("Enter the first number: "))
n2 = int(input("Enter the second number: "))
print(min(n1, n2))
print(max(n1, n2))
for i in range(min(n1, n2), max(n1, n2)):
    print(i, end=" ")
```

9. Write a line of code that prints the integer portion of the number `21.45`.

10. Write a short program that prompts the user for a floating point number and prints the smallest integer that is larger than the number the user entered.

11. Write a short program that chooses a random (secret) number between 1 and 10, then asks for guesses of the secret number from the user. The program should allow up to 10 guesses for the secret number and should print, after each guess, whether the guess was too high, too low, or correct. Note that your program may continue to go through a loop *after* the secret number has been correctly guessed. In that situation, *do not ask for another guess* but you can continue through the loop anyway.