

BIO 480/680 Computer Programming Study Guide I

The following is a sample program that could have been used for Lab Project 1, the simple exponential growth model using arrays for population size and time. Comments on the lines are shown in italics on the right.

```
"""
Exponential growth model using arrays
"""
import numpy as np    # Import the numpy library using the name "np"
steps = 10            # Use the variable steps for the number of solution steps
t = np.zeros(steps+1) # Set aside space for the two arrays
N = np.zeros(steps+1) # Each will need one extra row than steps
r = 0.5               # Set values for r and the initial N and t
t[0] = 0
N[0] = 2
for i in range( steps ):          # Solve the model equation
    N[i+1] = N[i] + r * N[i]
    t[i+1] = t[i] + 1              # Advance the time variable

for i in range( steps+1 ):        # Print the t and N results
    print( f"At time {t[i]}, N is {N[i]:6.4f}"
           # Use 4 digits to the right of the decimal for N
```

Now see if you can answer the following questions...

1) How many times will the line of text be printed when each of these loops execute?

```
for i in range( 5 ):
    print( "Some text..." )
```

```
for i in range( 10 ):
    print( "Some text...\n" )
```

```
for i in range( 5 ):
    print( "The value of i = {i}")<- What is the last value printed?
```

2) For each group of program lines below (considered separately), why would the program not work?

```
b = 2
x = 2 * B + 3
```

```
N = np.zeros(10)
N = 2
```

```
-----
```

```
print( f"X is {X} and Y is Y" )
```

```
-----
```

```
x = np.zeros(4)
for i in range(3)
    x[i] = 5 / i
```