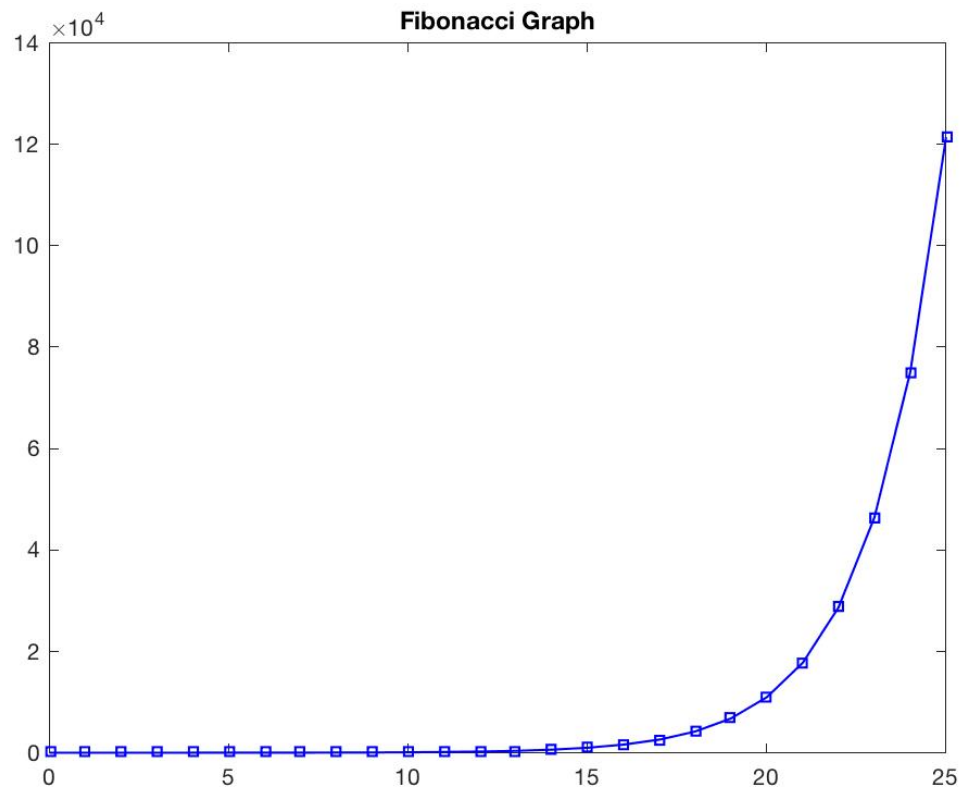


# ASSIGNMENT 1

## Exercise 1.5.2

### Question 1

1. Make a plot of the Fibonacci numbers up to 25. On the x axis should be the number of the sequence and on the y axis should be the Fibonacci number. What happens to the values as the sequence increases?

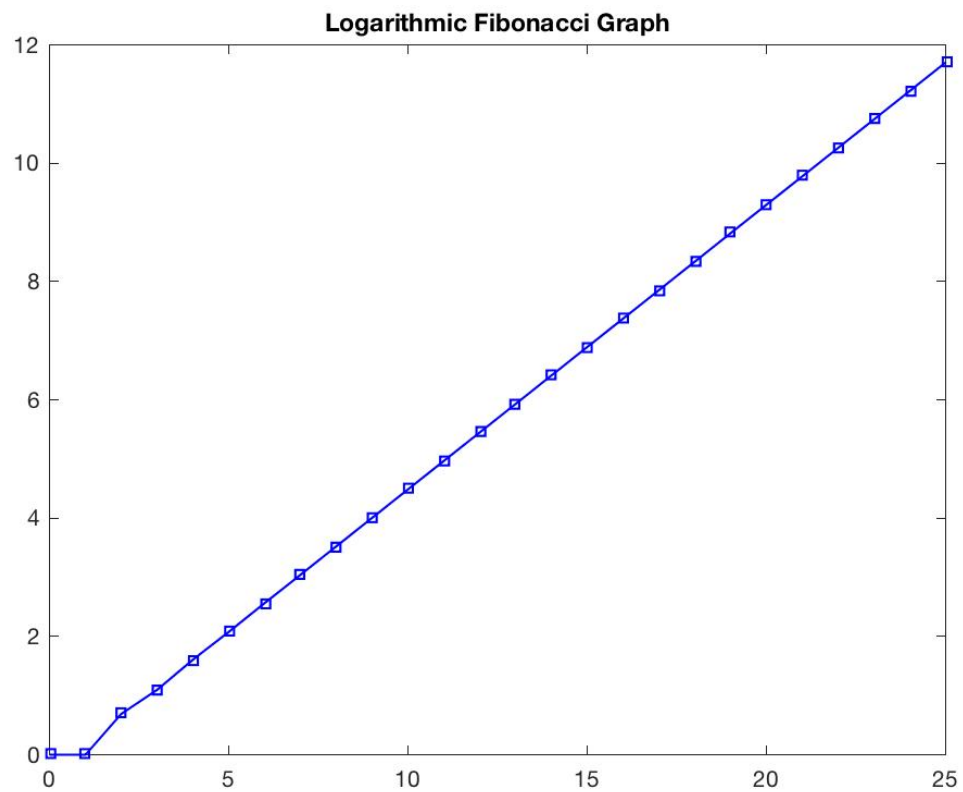


In the above plot, we see that the numbers seem to increase logarithmically.

See Code Attached.

### Question 2

2. Now make the same plot but instead of plotting the Fibonacci number, plot the logarithm of the Fibonacci number (use the log function). What does the plot look like now?



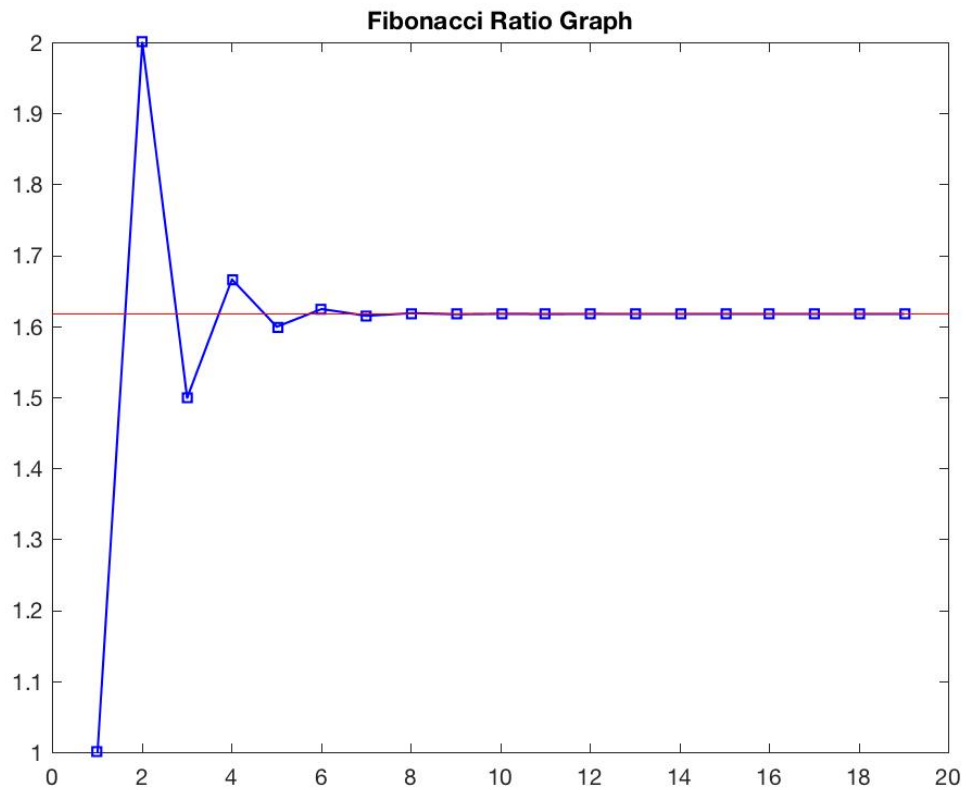
The Logarithmic of the Fibonacci numbers are shown as a straight line.

See code attached

## Exercise 1.5.3

### Question 1

1. Try to reproduce the plot above showing, for  $i = 1, \dots, 19$ , how the ratio of subsequent Fibonacci numbers tends to the Golden ratio.



The numbers fluctuate around a value of approximately 1.6180 and gradually becomes a straight line at  $y=1.6180$ .

## Source Code

### Functions File

```

1  function r = fibonacci(n)
2      r = [];
3      for elm = n
4          r = [r calculate_fibonacci(elm)];
5      end
6
7  function f = calculate_fibonacci(n)
8      if (n== 0)
9          f = 1;
10     elseif (n == 1)
11         f = 1;
12     elseif (n == 2)
13         f = 2;
14     else
15         f = calculate_fibonacci(n-1) + calculate_fibonacci(n-2);
16     end

```

### Script File

```

1  addpath('./functions') % Load the functions folder into the path
2
3  a = 0:25;
4  f = fibonacci(a);
5
6  % Draw Graph
7  fig = figure;
8  plot(a, f, '-bs', 'Linewidth', 1, 'Markersize', 5);
9  title('Fibonacci Curve');
10 saveas(fig, 'fig1', 'jpg');
11
12 fig = figure;
13 plot(a, log(f), '-bs', 'Linewidth', 1, 'Markersize', 5);
14 title('Logarithmic Fibonacci Curve');
15 saveas(fig, 'logfig1', 'jpg');
16
17 % ### Exercise 1.5.3
18 % Create matrix (2 by 20) with the first 20 fibonacci no.
19 f_20 = [fibonacci(0:18); fibonacci(1:19)];
20 % Convert each column into a Cell
21 C = num2cell(f_20, 1);
22 % apply a function on each cell (i.e. column)...
23 ratio = cellfun(@(c) c(2)/c(1), C);
24
25 % Draw Graph
26 fig = figure;
27 plot(1:19, ratio, '-bs', 'Linewidth', 1, 'Markersize', 5);
28 hold on;
29 plot([0,20], [1.6180,1.6180], 'r');
30 title('Logarithmic Fibonacci Curve');
31 saveas(fig, 'ratio', 'jpg');

```