Homework Submission Instructions

You can complete the homeworks with either MATLAB or Python. Use the interactive script format: live script (.mlx) for MATLAB and Jupyter notebook (.ipynb) for Python. **Please create a separate interactive script for each question in the problem set.** Include all text, equations, code (including functions), output and figures in the interactive script file. Do **not** use plain scripts (.m for MATLAB and .py for Python).

You will submit homeworks on **Gradescope**. There will be two assignment items for each homework, named “HW# code” and “HW# output” (# denotes the homework number). You must submit to **both** assignment items.
HW# code: Each interactive script file should be named as “HW#_Q#_Lastname” plus the file extension (e.g. HW1_Q2_Zhao.mlx for MATLAB; HW1_Q2_Zhao.ipynb for Python). Pack all interactive scripts in one ZIP file for submission. Do not include any file that we provide you as part of the homework.
HW# output: Convert all interactive script files to PDFs, and join them as one PDF file for submission. If you don’t have a good PDF editor on your computer, you can join them with *free* browser tools like this one:
https://www.adobe.com/acrobat/online/merge-pdf.html
During the submission process, you should assign PDF pages to their corresponding questions. The website also gives you an option of submitting images: do not use it.

	Interactive script	Plain script	PDF document
Format (MATLAB)	.mlx	.m	.pdf
Format (Python)	.ipynb	.py	.pdf
Usage	One for each question.	Do not use. Define functions in the interactive script.	One for each question. (Converted from interactive script.)
File name (without format extension)	HW#_Q#_Lastname (e.g. HW1_Q2_Zhao)	-	(Any file name is ok)
Submission format	Pack in one ZIP file and submit to “HW# code”.	-	Join as one PDF file and submit to “HW# output”.
Submission note	Do not pack any files other than the interactive scripts.	-	Assign PDF pages to their corresponding questions.

MATLAB live script

In a MATLAB live script, you can define functions at the end of the script. Do not use separate plain script files (.m) to define functions. To save the live script as a PDF file, click the “Export” button under the “LIVE EDITOR” tab and select “.pdf” format.

HW1_Q2_Zhao.mlx

Homework 1 - Question 2 - Xinyuan Zhao

(a)

Not all questions require code. You can write text by selecting **Text** mode. You can insert *equations* from under the INSERT tab:

$$a_{i+2} = a_{i+1} + a_i$$

(b)

Write some explanation for the code that follows. Write in-line comments in your code as well.

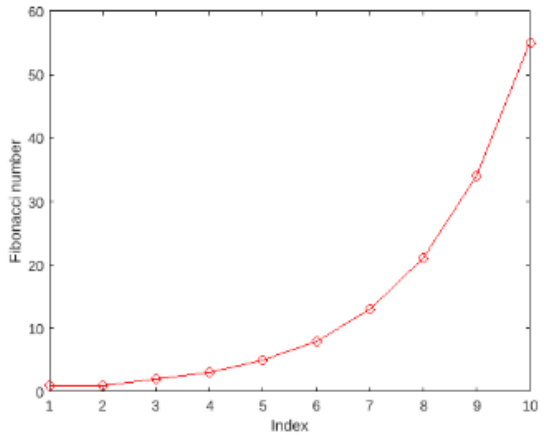
```
n = 10;
first_few_numbers = generate_fibonacci(10);  % The function definition is at the end

% You can answer some questions with a disp statement
disp(strcat(sprintf("The first %d numbers in the Fibonacci sequence are: ", n), num2str(first_few_numbers)))
```

```
The first 10 numbers in the Fibonacci sequence are: 1   1   2   3   5   8  13  21  34  55
```

(c)

Plot the numbers.

```
plot(1:n, first_few_numbers, "r-o")
xlabel("Index")
ylabel("Fibonacci number")
```



Explain the plot here.

Function definitions

Functions have to defined at the end of the script.

```
function seq = generate_fibonacci(n)
    seq = [];
    a = 1;  % First number in the sequence
    b = 1;  % Second number in the sequence
    for i=1:n
        seq = [seq a];
        c = b;
        b = a + b;
        a = c;
        % Compute the sequence recursively
    end
end
```

Python Jupyter notebook

To save the notebook as a PDF file, the best way is to go to File -> Print Preview, and print the webpage to PDF using your browser (the .pdf export in Jupyter requires a copy of LaTeX which is a huge download so avoid this).

jupyter HW1_Q2_Zhao Last Checkpoint: 13 minutes ago (autosaved)

Logout

File Edit View Insert Cell Kernel Help Not Trusted plenoptic

Run Markdown

Homework 1 - Question 2 - Xinyuan Zhao

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
```

(a)

Not all questions require code. You can write text in a **Markdown** cell like this. You can write *equations* using LaTeX between $ signs:

$$a_{i+2} = a_{i+1} + a_i$$

(b)

Write some explanation for the code that follows. Write in-line comments in your code as well.

In [2]:
```
def generate_fibonacci(n):
    """Generate first few numbers in the Fibonacci sequence"""
    seq = []
    a = 1  # First number in the sequence
    b = 1  # Second number in the sequence
    for i in range(n):
        seq.append(a)
        a, b = b, a + b  # Compute the sequence recursively
    return seq
```

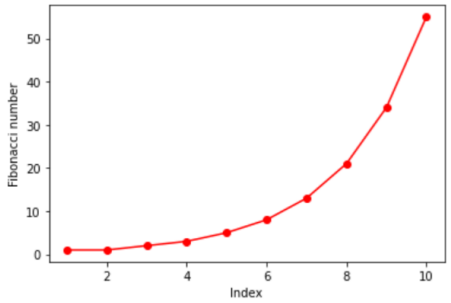
In [3]:
```
n = 10
first_few_numbers = generate_fibonacci(10)

# You can answer some questions with a print statement
print(f"The first {n} numbers in the Fibonacci sequence are {first_few_numbers}")
```

```
The first 10 numbers in the Fibonacci sequence are [1, 1, 2, 3, 5, 8, 13, 21, 34, 55]
```

(c)

Plot the numbers.

In [4]:
```
plt.plot(np.arange(1, n+1), first_few_numbers, "r-o")
plt.xlabel("Index")
plt.ylabel("Fibonacci number")
plt.show()
```



Explain the plot here.