Seatwork 04

Simple Fixed-Point Iteration

$$f(x) = x^2 \cos(x)$$

1. Create a new python file that will contain your code that implements simple fixed-point iteration, use your last name as the file name *(e.g sanglitan.py).*
2. I want to see a function named **g(x)** which should have a single line of code that returns the value of g(x). You have all the freedom to create any version of g(x) based on f(x). Just make sure it will converge.
3. Print every result of iteration, just like the table on my examples during our lectures. Also, the program should terminate if it reaches more than 10000 iterations without converging.
4. After solving for the result, print the results.
5. Use stopping error, $\mathbf{e_s = 0.0001}$ and feel free to experiment with the initial guess.

What I want to see in the python file:

sanglitan.py

```
1   # Simple Fixed Point Iteration
2
3   def g(x):
4       # Insert the equation here
5       pass
6
7
8   # Insert fixed-point code here
9
```

Sample Output:
This sample output solves a different function with a different stopping error.

```
C:\Users\Benjamin\Desktop\Demo>python sanglitan.py
i = 0, x_i = 1, error = N/A%
i = 1, x_i = 1.050541919, error = 4.81103%
i = 2, x_i = 1.024326358, error = 2.559298%
i = 3, x_i = 1.037841386, error = 1.302225%
i = 4, x_i = 1.030851801, error = 0.67804%
Root = 1.030851801
```

Seatwork 05

Newton-Raphson

$$f(x) = x^2 \cos(x)$$

1. Create a new python file that will contain your code that implements Newton-Raphson, use your last name as the file name *(e.g sanglitan.py).*
2. I want to see a function **f(x)** which returns the value of f(x). This function should contain one line of code only, particularly, one return statement.
3. Also, I want to see another function **df(x)** which solves for the vale of the first derivative of f(x). The same way, this function should only contain one single line of code.
4. Print every result of iteration, just like the table on my examples during our lectures. Also, the program should terminate if it reaches more than 10000 iterations without converging.
5. After solving for the result, print the results.
6. Use stopping error, $\mathbf{e_s = 0.0001}$ and feel free to experiment with the initial guess.

What I want to see in the python file:

sanglitan.py

```
# Newton-Raphson

def f(x):
    # Insert f(x) here


def df(x):
    # Insert the first derivative of f(x) here


# Insert Newton-Raphson Codes here


```

Sample Output:

This sample output solves a different function with a different stopping error.

```
C:\Users\Benjamin\Desktop\Demo>python sanglitan.py
i = 0, x_i = 1, error = N/A%
i = 1, x_i = 1.034546, error = 3.34%
i = 2, x_i = 1.033233, error = 0.13%
Root = 1.030851801
```

Seatwork 06

Secant Method

$$f(x) = x^2 \cos(x)$$

1. Create a new python file that will contain your code that implements the secant method, use your last name as the file name (e.g sanglitan.py).
2. I want to see a function **f(x)** which returns the value of f(x). This function should contain one line of code only, particularly, one return statement.
3. Print every result of iteration, just like the table on my examples during our lectures. Also, the program should terminate if it reaches more than 10000 iterations without converging.
4. After solving for the result, print the results.
5. Use stopping error, $\mathbf{e_s = 0.0001}$ and feel free to experiment with the initial guesses.

What I want to see in the python file:

sanglitan.py

```
# Secant

def f(x):
    # Insert f(x) here
    pass


# Insert Secant Method Codes here

```

Sample Output:

This sample output solves a different function with a different stopping error. It also doesn't show all the iterations. But your code must print out every iteration.

```
C:\Users\Benjamin\Desktop\Demo>python sanglitan.py
i = 0, x_i-1 = 2, x_i = 4, x_i+1 = 1.9370716, error = 106.5%
i = 1, x_i-1 = 4, x_i = 1.93707, x_i+1 = 1.8810047, error = 2.98%
Root = 1.03329
```