MODIFIED EULER METHOD

```
import matplotlib.pyplot as plt

def y(z):
    a2 = 0

    if z == 0:
        a2 = 1

    else:
        def yn(n):
            if n == 0:
                a1 = y(z - 1) + h * f(x(z - 1), y(z - 1))

            else:
                a1 = y(z - 1) + (h/2) * ( f(x(z - 1), y(z - 1)) + f(x(z), y
n(n - 1)) )

            return a1

        i = 1
        if yn(i) - yn(i-1) < E:
            a2 = yn(i)

        else:
            while (yn(i) - yn(i-1)) >= E:

                i += 1

            a2 = yn(i)

    return a2

def f(x, y):
    a3 = x**2 + y

    return a3

def x(m):
    if m == 0:
        a4 = 0
    else:
        a4 = x(0) + m*h

    return a4


x0 = 0
y0 = 1
```

```
h = 0.02

E = 0.01
X = []
Y = []

for i in range(6):
    X.append(x(i))
    Y.append(y(i))

print("X = ", X)
print("\nY = ", Y)

print("\n")
print("The value of y at x = 0.1 is ", Y[5])
```

OUTPUT –

```
X =  [0, 0.02, 0.04, 0.06, 0.08, 0.1]

Y =  [1, 1.020204, 1.0408322008000002, 1.0619093312561603, 1.0834606197475347,
1.105511804266435]


The value of y at x = 0.1 is  1.105511804266435
```