Lab Task 6
Numerical Computing Lab(105127)
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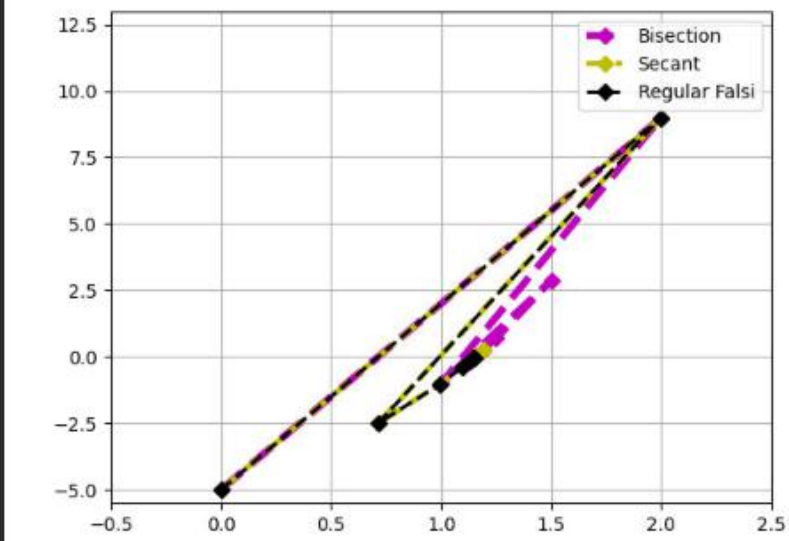
Q1:

```
import matplotlib.pyplot as plt


bix = []
rfx = []
sx = []
biy = []
rfy = []
sy = []


x1 = float (input("Enter x1: " ))
x2 = float (input("Enter x2: " ))
t = float (input("Enter tolerance: " ))

f = lambda x:x**3+3*x-5



def bissection(a,b,tol):
    bix.append(a)
    biy.append(f(a))
    bix.append(b)
    biy.append(f(b))
    niter=0
    while(abs(a-b)>=tol):
        mid=(a+b)/2.0
        prod1=f(a)*f(mid)
        prod2=f(b)*f(mid)
        if prod1<0:
            b=mid
        elif prod2<0:
            a=mid
        niter+=1
        bix.append(mid)
        biy.append(f(mid))
    return mid,niter


def rf(a,b,tol):
    rfx.append(a)
    rfy.append(f(a))
    rfx.append(b)
    rfy.append(f(b))
    niter=0
    while(abs(a-b)>=tol and niter <= 5):
        m=(a*f(b)-b*f(a))/(f(b)-f(a))
        prod1=f(a)*f(m)
        prod2=f(b)*f(m)
```

```
            if prod1<0:
                b=m
            elif prod2<0:
                a=m
            niter+=1
            rfx.append(m)
            rfy.append(f(m))
        return m,niter


def secant(fn,a,b,tol=1e-8,niter=100):
        sx.append(a)
        sy.append(f(a))
        sx.append(b)
        sy.append(f(b))
        for i in range(niter):
            c= b-(b-a)/(fn(b)-fn(a))*fn(b)
            sx.append(c)
            sy.append(f(c))
            if abs(c-b)<tol: break
            else:
                a,b=b,c
        else:
            print("Max Iteration Completed")
        return c,i



answer,n=bissection(x1,x2,t)
print(answer,n)

answer,n=rf(x1,x2,t)
print(answer,n)

root, iterr=secant(f,x1,x2,t)
print(root,iterr)


Bisec = plt.plot(bix,biy,label="Bisection",color='m',marker='D',linestyle='--', linewidth=4)
Sec = plt.plot(sx,sy,label="Secant",color='y', marker='D', linestyle='--', linewidth=3)
Rf = plt.plot(rfx,rfy,label="Regular Falsi",color='k', marker='D',linestyle='--', linewidth=2)
plt.xlim(-0.5,2.5)
plt.ylim(-5.5,13)
plt.legend()
plt.grid()
plt.show()
```




```
Enter x1: 0
Enter x2: 2
Enter tolerance: 0.001
1.1533203125 11
1.1518637870693227 6
1.1541715906925287 5
```

Q2:

```
a = [[8,5,9],[3,2,7],[10,14,8]]
b = [[4,5,2],[6,5,4],[2,4,8]]

add = [[a[i][j]+b[i][j] for j in range(len(b[0]))] for i in range(len(a))]

sub = [[a[i][j]-b[i][j] for j in range(len(b[0]))] for i in range(len(a))]

mul = [[sum(a[i][k]*b[k][j] for k in range(len(b))) for j in range(len(b[0]))] for i in range(len(a))]

div = [[a[i][j]/b[i][j] for j in range(len(b[0]))] for i in range(len(a))]

print('Add:')
print(add[0])
print(add[1])
print(add[2])
print('Sub:')
print(sub[0])
print(sub[1])
print(sub[2])
print('Mul:')
print(mul[0])
print(mul[1])
print(mul[2])
print('Div')
print(div[0])
print(div[1])
print(div[2])
```