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SID: 10578

NC_LAB 10

In [ ]:
```
def fx(x):
    return (1/(1+x**2))
```

In [ ]:
```
def differenceH(upperLim, lowerLim, intervals):
    loop_cond = True
    H =[0]
    difference = (upperLim - lowerLim)/intervals
    a = difference

    while loop_cond  is True:
        H.append(difference)

        difference = difference + a

        if (difference / upperLim) > 1:
            loop_cond = False
    return H
```

In [ ]:
```
H = []
H = differenceH(1,0,4)
print(H)
```

```
[0, 0.25, 0.5, 0.75, 1.0]
```

In [ ]:
```
approx =[]
for i in range(len(H)):
    approx.append(fx(H[i]))
    print(approx[i])
```

```
1.0
0.9411764705882353
0.8
0.64
0.5
```

In [ ]:
```
#(0.25/3) *(approx[0] +approx[-1] + (4* sum(list(filter(lambda x: x%2 ==0,approx[1:-1])
```

In [ ]:
```
(0.25/3) *(approx[0] +approx[-1] + (4* sum(approx[1:-1:2]) + 2*sum(approx[2:-2:2])))
```

Out[ ]:
```
0.785392156862745
```

In [ ]:
```
import scipy.integrate as si

ans, err = si.quad(fx,0,1)
ans
```

Out[ ]:
```
0.7853981633974484
```

In [ ]:
```
import math as m
```

Question 2

In [ ]:
```
def fx1(t):
    return (2000*m.log((140000)/(140000 - 2100*t))-9.8*t)
```

In [ ]:
```
H =differenceH(30,8,6)
H
```

Out[ ]:
```
[0,
 3.6666666666666665,
 7.333333333333333,
 11.0,
 14.666666666666666,
 18.333333333333332,
 22.0,
 25.666666666666668,
 29.333333333333336]
```

In [ ]:
```
approx1 =[]
for i in range(len(H)):
    approx1.append(fx1(H[i]))
    print(approx1[i])
```

```
0.0
77.20736964345514
161.20096584523654
252.84710826256293
353.1893852636661
463.500581588258
585.3551331942507
720.7326890179049
872.1703238392176
```

In [ ]:
```
direct_method = (H[1]/3) * (approx1[0]+approx1[-1] + (4*(sum(approx1[1:-1:2]))) + (2*(s
direct_method
```

Out[ ]:
```
11157.437239048526
```

In [ ]:
```
import scipy.integrate as si

ans, err =si.quad(fx1, 8,30)
ans
```

Out[ ]:
```
11061.335535080994
```

In [ ]:
```
print("By Direct Method: ", direct_method)
print("By simpson integral Mathod: ", ans)
print("Error: ", ans - direct_method)
```

```
By Direct Method:  11157.437239048526
By simpson integral Mathod:  11061.335535080994
Error:  -96.10170396753165
```