In [ ]:
```
print(" "*35,"Atul_Arya\n"," "*34,"CSC/22/11\n","-"*80,
'''
Problem!
WAP to compute the gradient and Hessian of the function => f(x) = 100(x_2 - x_1**2)**2 + (1 - x_1)**2
''')
```

```
                                   Atul_Arya
                                   CSC/22/11
--------------------------------------------------------------------------------
Problem!
WAP to compute the gradient and Hessian of the function => f(x) = 100(x_2 - x_1**2)**2 + (1 - x_1)**2
```

In [ ]:
```
import sympy as sp

# Define the symbolic variables
x1, x2 = sp.symbols('x1 x2')


f = 100 * (x2 - x1**2)**2 + (1 - x1)**2
def gradient(x1, x2):
    gradient = [sp.diff(f, var) for var in (x1, x2)]
    return gradient

def hassian(x1, x2):
    hassian = [[sp.diff(gradient(x1,x2)[i], var) for var in (x1, x2)] for i in (0,1)]
    return hassian


# Print the results
print("Gradient:")
print(gradient(x1, x2))
print()
print("Hessian Matrix:")
for row in hassian(x1, x2):
    print(row)
```

```
Gradient:
[-400*x1*(-x1**2 + x2) + 2*x1 - 2, -200*x1**2 + 200*x2]

Hessian Matrix:
[1200*x1**2 - 400*x2 + 2, -400*x1]
[-400*x1, 200]
```