Class Assessment - 1

Q.1 What is Optimization?Define the types of Optimization?

Optimization refers to the process of improving the performance, efficiency, and effectiveness of code. This can involve reducing the execution time, memory usage, or resource consumption of a program. Optimization is crucial in large-scale applications or in scenarios where performance is critical.
Types of Optimization are:

1. Time-Complexity Optimization:
    - Algorithm selection:- Choosing efficient algorithm for a task.
    - Data structure selection:- Selecting appropriate data structures that are time-efficient.
2. Space Complexity:
    - Memory allocation(and deallocation):- To avoid bottlenecks and memory leaks, managing memory allocation and deallocation efficiently is important.
    - Data compression:- Compressing data to reduce storage requirments.
3. Code readability:
    - Commenting
    - Formatting
    - Modularization
4. Energy consumption optimization:
    - Power-saving techniques
    - Using cache
5. Performance profiling
    - Identifying bottlenecks
    - Prioritize optimization

Q.2 Minimize the function for the code f(x,y)=x^2+y^2+3x+4y+5.

```python
import sympy as sp
x,y=sp.symbols('x y')
print("Given Function f(x,y) is:- f=x**2+y**2+3*x+4*y+5 ")
f=x**2+y**2+3*x+4*y+5
print("Derivative w.r.t x: ")
dfdx=sp.diff(f, x)
print(dfdx)
print("Derivative w.r.t y: ")
dfdy=sp.diff(f, y)
print(dfdy)
val = sp.solve([dfdx, dfdy], [x, y])
x_val = val[x].evalf()
y_val = val[y].evalf()
val1= [x_val, y_val]
print("Minimum found at (x,y):- ",val1)
min_f=f.subs({x: x_val,y: y_val})
print("Minimum value of the function is:-",min_f)
```

Output:

```
Given Function f(x,y) is:- f=x**2+y**2+3*x+4*y+5
Derivative w.r.t x:
2*x + 3
Derivative w.r.t y:
2*y + 4
Minimum found at (x,y):-  [-1.50000000000000, -2.00000000000000]
Minimum value of the function is:- -1.25000000000000
```