

ASSIGNMENT – 9

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Lab 9 :-

Documentation Generation – Automatic Documentation and Code Comments

Problem 1

Given Python Function

```
def find_max(numbers):
    return max(numbers)
```

(a) Docstring Documentation

```
def find_max(numbers):
    Returns the maximum value from a list of numbers.
```

Parameters:

numbers (list): A list of numeric values.

Returns:

int or float: The maximum value in the list.

```
return max(numbers)
```

(b) Inline Comments

```
def find_max(numbers):
    # Find and return the maximum value from the list
    return max(numbers)
```

(c) Google-Style Documentation

```

def find_max(numbers):
    """Finds the maximum value in a list of numbers.

    Args:
        numbers (list): A list containing numeric values.

    Returns:
        int or float: The largest number in the list.

    """
    return max(numbers)

```

Critical Comparison

- **Docstrings** provide structured internal documentation and are accessible using `help()` and `pydoc`.
- **Inline comments** are simple but limited and unsuitable for detailed explanations.
- **Google-style documentation** is highly readable, standardized, and ideal for large projects.

Recommendation

For a mathematical utilities library, **Google-style documentation** is most effective due to its clarity, consistency, and compatibility with documentation tools.

Problem 2

Given Python Function

```

def login(user, password, credentials):
    return credentials.get(user) == password

```

(a) Docstring Documentation

```

def login(user, password, credentials):
    """Verifies user login credentials.

    Parameters:
        user (str): Username
        password (str): User password
        credentials (dict): Dictionary of stored credentials

    Returns:
        bool: True if login is successful, False otherwise
        return credentials.get(user) == password

```

(b) Inline Comments

```

def login(user, password, credentials):

```

```
# Check if the entered password matches stored credentials
return credentials.get(user) == password
```

(c) Google-Style Documentation

```
def login(user, password, credentials):
    """Authenticates a user using provided credentials.

    Args:
        user (str): Username of the user.
        password (str): Password entered by the user.
        credentials (dict): Dictionary mapping users to passwords.

    Returns:
        bool: True if authentication succeeds, otherwise False.

    return credentials.get(user) == password
```

Comparison and Recommendation

Google-style documentation is most helpful for **new developers onboarding a project** because it clearly explains parameters, return values, and intent in a standardized format.

Problem 3 – Calculator Module

calculator.py

```
def add(a, b):
    """Returns the sum of two numbers.

    return a + b
```

```
def subtract(a, b):
    """Returns the difference of two numbers.

    return a - b
```

```
def multiply(a, b):
    """Returns the product of two numbers.

    return a * b
```

```
def divide(a, b):
    """Returns the quotient of two numbers.

    return a / b
```

Documentation Generation

- Terminal documentation: help(calculator)
- HTML documentation generation:

```
pydoc -w calculator
```

The generated calculator.html file is opened in a web browser to verify documentation.

Problem 4 – Conversion Utilities Module

conversion.py

```
def decimal_to_binary(n):  
    Converts a decimal number to binary.  
    return bin(n)[2:]  
  
def binary_to_decimal(b):  
    Converts a binary number to decimal.  
    return int(b, 2)  
  
def decimal_to_hexadecimal(n):  
    Converts a decimal number to hexadecimal.  
    return hex(n)[2:]
```

Documentation Generation

- Terminal: help(conversion)
- HTML export using:

```
pydoc -w conversion
```

Problem 5 – Course Management Module

course.py

```
courses = {}  
  
def add_course(course_id, name, credits):  
    Adds a new course to the course list.  
    courses[course_id] = {'name': name, 'credits': credits}  
  
def remove_course(course_id):  
    Removes a course using course ID.  
    courses.pop(course_id, None)
```

```
def get_course(course_id):
    Retrieves course details by course ID.
    return courses.get(course_id)
```

Documentation Generation

- Terminal documentation using `help(course)`
- HTML documentation exported using:

```
pydoc -w course
```

The generated HTML file is opened in a browser to verify correctness.

Conclusion

This lab demonstrates the importance of proper documentation in software development. Automatic documentation generation improves maintainability, onboarding efficiency, and overall code quality. Google-style docstrings are recommended for professional and collaborative projects.