\documentclass[12pt]{article}

\usepackage{graphicx} % Required for inserting images

\usepackage{amssymb}

\usepackage{amsmath}

\usepackage{listings}

\usepackage{fancyhdr}

\title{Homework Assignment: Python and LaTeX Practice}

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\begin{document}

\maketitle

\section{Introduction}

This report covers the solutions to the Python tasks and the associated mathematical explanations. This assignment aims to practice writing Python code for simple calculations and using \LaTeX\ to document the work.

\section{Python Code}

\textbf{Task 1}

\begin{lstlisting}[language=Python]

1. Create two variables: `x = 5` (integer) and `y = 2.5` (float).

2. Perform the following operations and print the result:

- Add `x` and `y`.

- Subtract `x` from `y`.

- Multiply `x` by `y`.

- Raise `x` to the power of 2.

- Use floor division (`//`) to divide `x` by 2.

x = 5 # integer

y = 2.5 # float

print(x + y) # Addition

print(y - x) # Subtraction

print(x \* y) # Multiplication

print(x \*\* 2) # Exponentiation (x to the power of 2)

print(x // 2) # Floor division

\end{lstlisting}

\textbf{Task 2}

\begin{lstlisting}[language=Python]

1. Create a list `my list = [1, 2, 3, 4, 5]`.

2. Replace the third element with `"hello"`.

3. Add the element `"world"` to the end of the list.

4. Remove the first element from the list.

5. Print the final list.

my\_list = [1, 2, 3, 4, 5]

my\_list[2] = "hello"

my\_list.append("world")

my\_list.pop(0)

print(my list)

\end{lstlisting}

\textbf{Task 3}

\begin{lstlisting}[language=Python]

1. Create a dictionary `student\_scores` with the following key-value pairs:

- `'Alice': 85`

- `'Bob': 90`

- `'Charlie': 78`

2. Add a new student `'David'` with a score of `88`.

3. Update `'Alice'`'s score to `95`.

4. Delete `'Charlie'` from the dictionary.

5. Print the final dictionary.

student\_scores = {'Alice': 85,'Bob': 90,'Charlie': 78}

student\_scores['David'] = 88

student\_scores['Alice'] = 95

del student\_scores['Charlie']

print(student\_scores)

\end{lstlisting}

\textbf{Task 4}

\begin{lstlisting}[language=Python]

1. Define a function `calculate\_area` that calculates the area of a rectangle. The function should take two arguments: `width` and `height`.

2. Call the function with `width = 5` and `height = 10`, and print the result.

def calculate\_area(width, height):

return width \* height

result = calculate\_area(5, 10)

print(result)

\end{lstlisting}

\textbf{Task 5}

\begin{lstlisting}[language=Python]

1. Create a class `Animal` with the following methods:

- `\_\_init\_\_(self, name)`: Initializes the name of the animal.

- `speak(self)`: Prints `"The animal speaks"`.

2. Create a subclass `Dog` that inherits from `Animal` and overrides the `speak` method to print `"Woof! Woof!"`.

3. Create an instance of `Dog` with the name `"Buddy"` and call its `speak` method.

class Animal:

def \_\_init\_\_(self, name):

self.name = name

def speak(self):

print("The animal speaks")

class Dog(Animal):

def speak(self):

print("Woof! Woof!")

my\_dog = Dog("Buddy")

my\_dog.speak()

\end{lstlisting}

\section{Mathematical Explanation}

The formula for calculating the area of a rectangle is given by:

\[

A = \text{width} \times \text{height}

\]

where \( A \) is the area, and the width and height are the rectangle's dimensions.

\section{Conclusion}

This assignment helped me practice Python coding and LaTeX editing skills that I learned in the previous lessons.

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