Title: Homework Assignment: Python and LaTeX Practice

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1 Introduction

This report reviews the solutions to Python exercises along with the relevant mathematical explanations and a brief reflection on the skills learned and the challenges faced.

2 Python Code

Presented here is the Python code corresponding to the assignment:

2.1 Q1. Basic Data Types

```python
#1 Create two variables: 'x = 5' (integer) and 'y = 2.5' (
   float).
x = 5
#2 Perform the following operations and print the result:
y = 2.5
#3 Add 'x' and 'y'.
print(x+y)
#4 Subtract 'x' from 'y'
print(y-x)
#5 Multiply 'x' by 'y'
print(x*y)
#6 Raise 'x' to the power of 2.
print(x**2)
#7 Use floor division ('//') to divide 'x' by 2.
print(x//2)
```

2.2 Q2. Lists

```python
#1 Create a list 'my_list = [1, 2, 3, 4, 5]'.
my_list = [1, 2, 3, 4, 5]
```

```python
#2 Replace the third element with '"hello"'.
my_list = [1, 2, "Hello", 4, 5]
#3 Add the element '"world"' to the end of the list.
my_list = [1, 2, "Hello", 4, "World"]
#4 Remove the first element from the list.
my_list = [2, "Hello", 4, "World"]
#5 Print the final list.
print(my_list)
```

2.3   Q3. Dictionaries

```python
#1 Create a dictionary 'student_scores' with the following key
   -value pairs: '"Alice": 85', '"Bob": 90', '"Charlie": 78'
student_scores = {'Alice': 85, 'Bob': 90,'Charlie': 78}
#2 Add a new student ''David'' with a score of '88'.
student_scores['David'] = 88
#3 Update ''Alice'''s score to '95'.
student_scores['Alice'] = 95
#4 Delete ''Charlie'' from the dictionary.
del student_scores['Charlie']
#5 Print the final dictionary.
print(student_scores)
```

2.4   Q4. Functions

```python
#1a Define a function 'calculate_area' that calculates the
   area of a rectangle
def calculate_area(width, height):
    #1b Formula for the area of a rectangle: Area = width *
       height
```

```python
        return width * height


#2 Call the function with 'width = 5' and 'height = 10'
result = calculate_area(5, 10)


# Print the result
result
```

2.5   Q5. Classes and Inheritance

```python
#1 Create a class 'Animal' with methods '__init__' and 'speak'
class Animal:
    def __init__(self, name):
        self.name = name


    def speak(self):
        print("The animal speaks")


#2 Create a subclass 'Dog' that inherits from 'Animal' and
   overrides 'speak'
class Dog(Animal):
    def speak(self):
        print("Woof! Woof!")


#3 Create an instance of 'Dog' with the name '"Buddy"' and
   call its 'speak' method
dog = Dog("Buddy")
dog.speak()   #print "Woof! Woof!"
```

3   Mathematical Explanation

Task 4: The equation used to determine the area of a rectangle is:

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

where A represents the area, and the width and height are the rectangle's dimensions.

4   Conclusion

This assignment was a great opportunity for me to practice both Python and LaTeX. I was able to work with basic Python concepts like data types, lists, dictionaries, and functions, and also explore object-oriented programming with classes. At the same time, I learned how to use LaTeX to present my code in a clean and organized way. Overall, it helped me improve my understanding of programming and technical writing. It was a good challenge, and I feel more confident now in both areas after completing it.