Function (QnA)

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Question 1

- Define a function calculate_area(length, width) that takes two positional arguments, length and width, and returns the area of a rectangle. Then, write a second function calculate_volume(length, width, height=10) that uses both positional arguments and a keyword argument height with a default value of 10.

Answer 1

Example (Python Code)

```python
# Function to calculate the area of a rectangle
def calculate_area(length, width):
    return length * width

# Function to calculate the volume of a rectangular prism
def calculate_volume(length, width, height=10):
    return length * width * height
```

Answer 1 (Contd...)

Example (Python Code)

```
area = calculate_area(5, 4)
print("Area of rectangle:", area)

volume1 = calculate_volume(5, 4)
print("Volume with default height:", volume1)

volume2 = calculate_volume(5, 4, 15)
print("Volume with custom height:", volume2)
```

Question 2

- Write a function greet_user(name, greeting='Hello') that takes a name as a required argument and a greeting as an optional parameter with a default value of "Hello". The function should return a message in the format: "[Greeting], [Name]!"

Answer 2

Example (Python Code)

```
def greet_user(name, greeting=’Hello’):
    return f"{greeting}, {name}!"
```

Answer 2 (Contd...)

Example (Python Code)

```python
# Using the default greeting
message1 = greet_user("Premanand")
print(message1)

# Using a custom greeting
message2 = greet_user("Anand", "Good morning")
print(message2)
```

Question 3

- Define a variable count with a value of 10 outside any function. Then, define a function increment_count that attempts to increment count by 1. Print count before and after calling increment_count.

Answer 3

Example (Python Code)

```
count = 10

# Function to increment the global variable count
def increment_count():
    global count
    count += 1

# Print count before calling increment_count
print("Count before increment:", count)

# Call the function
increment_count()

# Print count after calling increment_count
print("Count after increment:", count)
```

Question 4

- Create a function sum_all(*args) that takes a variable number of arguments and returns their sum.

Answer 4

Example (Python Code)

```
def sum_all(*args):
    return sum(args)
```

Answer 4 (Contd...)

Example (Python Code)

```
# Sum with three arguments
result1 = sum_all(1, 2, 3)
print(result1)

# Sum with five arguments
result2 = sum_all(4, 5, 6, 7, 8)
print(result2)

# Sum with no arguments
result3 = sum_all()
print(result3)
```

Question 5

- Create another function display_info(**kwargs) that takes arbitrary keyword arguments and prints each key-value pair.

Answer 5

Example (Python Code)

```
def display_info(**kwargs):
    for key, value in kwargs.items():
        print(f"{key}: {value}")
```

Answer 5 (Contd...)

Example (Python Code)

```python
# Calling display_info with multiple keyword arguments
display_info(name="Premanand", age=38, city="Chennai")


# Calling display_info with different keyword arguments
display_info(course="Python Programming",
    duration="5 months", level="Begineer")
```

Recursive functions

- Recursive Factorial Function Explanation on YouTube

Question 6

- Write a recursive function factorial(n) that returns the factorial of a given number n.

Answer 6

Example (Python Code)

```
def factorial(n):
    # Base case: if n is 0 or 1, return 1
    if n == 0 or n == 1:
        return 1
    # Recursive case: n * factorial of (n-1)
    else:
        return n * factorial(n - 1)
```

Answer 6 (Contd...)

Example (Python Code)

```python
# Factorial of 5
result1 = factorial(5)
print("Factorial of 5:", result1)

# Factorial of 0
result2 = factorial(0)
print("Factorial of 0:", result2)
```

Question 7

- Write a recursive function fibonacci(n) that returns the n-th term in the Fibonacci sequence, where the sequence starts with 0, 1, 1, 2, ...
- Fibonacci animation Explanation on YouTube

Answer 7

Example (Python Code)

```python
def fibonacci(n):
    # Base cases: return n if n is 0 or 1
    if n == 0:
        return 0
    elif n == 1:
        return 1
    # Recursive case: sum of the two preceding terms
    else:
        return fibonacci(n - 1) + fibonacci(n - 2)
```

Answer 7 (Contd...)

Example (Python Code)

```
# Get the 5th term in the Fibonacci sequence
result1 = fibonacci(5)
print("5th term in Fibonacci sequence:", result1)

# Get the 10th term in the Fibonacci sequence
result2 = fibonacci(10)
print("10th term in Fibonacci sequence:", result2)
```

Question 8

- Define a function shopping_list(budget, *items, **discounts) that:
  - Accepts a budget as a positional argument.
  - Accepts a list of items as arbitrary positional arguments *items.
  - Accepts specific discounts on items as keyword arguments **discounts.
  - The function should print each item, whether it has a discount, and display the remaining budget.

Answer 8

Example (Python Code)

```
def shopping_list(budget, *items, **discounts):
    print(f"Initial budget: ${budget}")

    for item in items:
        if item in discounts:
            discount = discounts[item]
            print(f"{item}: Discount applied - ${discount}")
            budget -= discount
        else:
            print(f"{item}: No discount")

    print(f"Remaining budget: ${budget}")
```

Answer 8 (Contd...)

Example (Python Code)

```
shopping_list(100, "apple", "banana", "milk", "bread",
                                  apple=50, milk=20)

Initial budget: Rs:100
apple: Discount applied - Rs:50
banana: No discount
milk: Discount applied - Rs:20
bread: No discount
Remaining budget: Rs: 30
```

Question 9

- Write a recursive function power(base, exponent) that calculates the value of base raised to the power of exponent.

Answer 9

Example (Python Code)

```
def power(base, exponent):
    # Base case: if exponent is 0, return 1
    if exponent == 0:
        return 1
    # Recursive case: multiply base by power(base, exponent -
    else:
        return base * power(base, exponent - 1)
```

Answer 9 (Contd...)

Example (Python Code)

```
# Calculate 2 raised to the power of 3
result1 = power(2, 3)
print("2^3 =", result1)

# Calculate 5 raised to the power of 0
result2 = power(5, 0)
print("5^0 =", result2)

# Calculate 3 raised to the power of 4
result3 = power(3, 4)
print("3^4 =", result3)
```

Question 10

- Write a function outer() that defines a variable x = "Outer scope" and an inner function inner() that changes x to "Inner scope". Print x from within inner() and then print x from within outer() after calling inner(). Observe the effect of variable scope.

Answer 10

Example (Python Code)

```python
def outer():
    x = "Outer scope"
    print("In outer() before calling inner():", x)

    def inner():
        nonlocal x
        x = "Inner scope"
        print("In inner():", x)

    inner()  # Call the inner function
    print("In outer() after calling inner():", x)

# Call the outer function to see the effect
outer()
```

Question 11

- Use a lambda function with map() to convert a list of temperatures from Celsius to Fahrenheit.

Answer 11

Example (Python Code)

```
# List of temperatures in Celsius
celsius_temps = [0, 20, 30, 37, 100]

# Convert Celsius to Fahrenheit using lambda and map
fahrenheit_temps = list(map(lambda c: (c * 9/5) + 32, celsius_

# Print the resulting list of temperatures in Fahrenheit
print("Temperatures in Fahrenheit:", fahrenheit_temps)

Output:
Temperatures in Fahrenheit: [32.0, 68.0, 86.0, 98.6, 212.0]
```

Question 12

- Use a lambda function with filter() to filter out even numbers from a list of integers.

Answer 12

Example (Python Code)

```
# List of integers
numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

# Use filter() with a lambda function to keep only odd numbers
odd_numbers = list(filter(lambda x: x % 2 != 0, numbers))

# Print the resulting list of odd numbers
print("Odd numbers:", odd_numbers)

Output:
Odd numbers: [1, 3, 5, 7, 9]
```

Question 13

- Write a recursive function is_palindrome(s) that checks if a given string s is a palindrome (reads the same forwards and backwards).

Answer 13

Example (Python Code)

```
def is_palindrome(s):
    # Base case: If the string has 0 or 1 characters, it’s a p
    if len(s) <= 1:
        return True
    # Recursive case: Check if the first and last characters a
    elif s[0] == s[-1]:
        # Call is_palindrome on the substring excluding the fi
        return is_palindrome(s[1:-1])
    else:
        return False
```

Answer 13 (Contd...)

Example (Python Code)

```
print(is_palindrome("radar"))
print(is_palindrome("hello"))
print(is_palindrome("level"))
print(is_palindrome("world"))
```

Question 14

- Write a function find_max(*args) that takes any number of arguments and returns the maximum value.

Answer 14

Example (Python Code)

```
def find_max(*args):
    # Check if any arguments are provided
    if not args:
        return None  # Return None if no arguments are given
    return max(args)  # Use the built-in max() function to fi
```

Answer 14 (Contd...)

Example (Python Code)

```
print(find_max(10, 20, 30, 40))
print(find_max(5, -2, 9, 3))
print(find_max())
```

Question 15

- Given a list of dictionaries representing people ('name': 'Premanand', 'age': 38), use a lambda function to sort the list by age.

Answer 14

Example (Python Code)

```
# List of dictionaries representing people
people = [
    {’name’: ’Premanand’, ’age’: 38},
    {’name’: ’Santhalakshmi’, ’age’: 38},
    {’name’: ’Nikhilesh’, ’age’: 8},
    {’name’: ’Krithiksha’, ’age’: 3}
]

# Sort the list of dictionaries by ’age’ using lambda
sorted_people = sorted(people, key=lambda person: person[’age

# Print the sorted list
print(sorted_people)
```

Answer 14 (Contd...)

Example (Python Code)

```
[{’name’: ’Krithiksha’, ’age’: 3},
{’name’: ’Nikhilesh’, ’age’: 8},
{’name’: ’Premanand’, ’age’: 38},
{’name’: ’Santhalakshmi’, ’age’: 38}]
```