Week-5 Graded Assignment (Theory)

Problem 1 [3]

```
def f(a=1, b=2, c, d):
    return a + b + c + d
print(f(0, 0, 3, 4))
```

Question

What will be the output of the above code-snippet?

(a) 10
(b) 3
(c) 7
(d) SyntaxError

Answer

(d) SyntaxError

Solution

Keyword argument should given at the end after the place holding arguments

Tags

functions

Problem 2

```
def f(a, b, c=10, d=19):
    return a + b + c + d
```

Question a [2]

What will `f(1, 2)` return?

(a) 3
(b) 32
(c) 29
(d) SyntaxError

Answer a

(b) 32

Question b [2]

What will `f(c=1, d=2, 1, 2)` return?

(a) 3
(b) 32
(c) 29
(d) SyntaxError

Answer b

(d) SyntaxError

Solution

`a` and `b` take the values `1` and `2`. `c` and `d` have the default values `10` and `19` . Hence, the return value be $1 + 2 + 10 + 19 = 32$.

Tags

functions

Problem 3 [4]

Question

```
def assert(x):
    return x==int(str(x))
assert(1)
```

What will be the output of the code?

(a) True
(b) False
(c) Return no value
(d) SyntaxError

Answer

(d) SyntaxError

Solution

keywords cannot made as function names.

Tags

functions, keywords

Problem 4 [4]

Question

```
def f():
    return x
x = 10
print(f())
```

What will be the output of the above code?

(a) None
(b) 10
(c) NameError
(d) SyntaxError

Answer

(b) 10

Solution

`x` have the global scope, hence `x` used inside the function it will have have the value 10.

Note: When the value of `x` is altered inside the function then it will result in an error. It can be resolved defining `x` inside the function or using `global x` which lets the program to know `x` is global variable.

Tags

functions

Problem 5

```
def f(x):
    if x == 0:
        return x
    elif x > 5:
        return g(x-2)
    else:
        return f(x-1)

def g(x):
    if x == 0:
        return x
    elif x > 5:
        return f(x-1)
    else:
        return g(x-2)
```

Question a [4]

Given that $0 \leq x \leq 10$, when does a recursion error occur in the given code? It is a Multiple Select Question (MSQ).

(a) At any level of recursion when a positive odd number which is less than 5 is passed into `g()`
(b) At any level of recursion when a positive odd number which is less than 5 passed into `f()`
(c) At any level of recursion 5 is passed into `g()`
(d) At any level of recursion 5 is passed into `f()`

Answer a

(a) At any level of recursion when a positive odd number which is less than 5 is passed into `g()`
(c) At any level of recursion 5 is passed into `g()`

Solution

function f	Returning value
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	RecursionError
8	0
9	0
10	RecursionError

function g	Returning value
0	0
1	RecursionError
2	0
3	RecursionError
4	0
5	RecursionError
6	0
7	0
8	RecursionError
9	0
10	0

Question b [4]

For `5 < x < 10`, enter the values of `x` for which `f(x)` results in a `RecursionError`. It is a Numerical Answer Type (NAT) question.

Answer b

7

Solution

Self explanatory

Question c [4]

For `5 < x < 10`, enter the values of `x` for which `g(x)` results in a `RecursionError`. It is a Numerical Answer Type (NAT) question.

Answer c

8

Solution

Self explanatory

Tags

Problem 6 [4]

Question

```
import random
x = random.random()
for i in range(4):
    print(x)
```

What is/are the possible outputs for the given code? It is a Multiple Select Question (MSQ).

(a)

```
0.8050796857929327
0.594136093400026
0.34224707799217524
0.6758211524540326
```

(b)

```
0.5830809720043407
0.5830809720043407
0.5830809720043407
0.5830809720043407
```

(c)

```
0.922785520795311
0.531735912593371
0.5791968649226946
0.5791968649226946
```

(d)

```
0.8507248045932425
0.8547127179926637
0.8757817076206122
0.383942471128478
```

Answer

(b)

```
0.5830809720043407
0.5830809720043407
0.5830809720043407
0.5830809720043407
```

Solution

`x` holds the random real number between 0 to 1 using `random` library's `random` function. The same `x` is printed four times using the for statement. Hence, the all lines of output should be same.

Tags

Problem 7

Refer https://docs.python.org/3/library/math.html#math.hypot

Question a [2]

For a right-angled triangle, what are the appropriate arguments that can be passed into the function `math.hypot()`?

(a) Lengths of the sides which are adjacent to the right angle (90 degrees)
(b) Lengths of the three sides of the right-angled triangle
(c) All three angles between the sides (in degrees) of the right-angled triangle
(d) Any two angles between the sides (in degrees) of the right-angled triangle

Answer

(a) Length of the sides which are adjacent to the right angle (90 degrees)

Solution

`math.hypot()` takes the arguments and returns the square root of sum of squares $\sqrt{a^2 + b^2}$. By, taking taking two sides adjacent to the right angle will give the hypotenuse.

Question b [4]

What is the minimum number of arguments required for the function `math.hypot()` for it to return a value without throwing any error?

(a) 0
(b) 1
(c) 2
(d) 3

Answer

(a) 0

Solution

By default `math.hypot()` with no parameter will indeed return a value `0`. This is true in Python version 3.8 and above. However, in earlier versions of Python, this is not true: at least two arguments are required.

Question c [4]

Is the following statement true or false?

`math.hypot(a, b)` always returns a positive value, where `a` and `b` are real numbers.

(a) True
(b) False

Answer

(a) True

Solution

There is a slight ambiguity here. `math.hypot` always returns a non-negative value. It could also return zero.

Tags

Problem 8 [5]

Question

Fill `XXXX` and `YYYY` to print 0 to 4 each in a new line. It is a Multiple Select Question (MSQ).

```
1 def f(XXXX):
2     for i in range(n):
3         print(i)
4 YYYY
5 f()
```

Expected Output

```
1 0
2 1
3 2
4 3
5 4
```

(a) `XXXX: n = 10` and `YYYY: n = n-5`
(b) `XXXX: n = 5` and `YYYY:`
(c) `XXXX:` and `YYYY:`
(d) `XXXX:` and `YYYY: n = 5`

Answer

(b), (d)

Solution

Option	Comment
`XXXX: n = 10` and `YYYY: n = n-5`	At line 5, `n = n-5` will throw an error where `n` is not defined.
`XXXX: n = 5` and `YYYY:`	`n=5` is given as default argument hence it will print expected output.
`XXXX:` and `YYYY:`	Throw an error inside the function that `n` is not defined.
`XXXX:` and `YYYY: n = 5`	`n` is defined outside the function with global scope and can be accessed inside the function.

Problem 9 [4]

Question

Choose the correct code to get the output `8.0`.

```
import math
'''Fill in the code'''
print(s(64))
```

(a) `s = math.sqrt`
(b) `s = math.sqrt()`
(c) `s = sqrt`
(d) `s = 8.0`

Answer

(a) `s = math.sqrt`

Solution

`s` becomes a function by assigning the `math.sqrt` to it. Thus, `s` and `math.sqrt` are equivalent.