Trace table examples

Walk through these while loops .

**While loop 1**

|  |  |
| --- | --- |
| 1  2  3  4  5  6 | from time import sleep  count = 5  while count != 0:  print(count)  count = count - 1  sleep(1) |

**Complete the table:**

|  |  |  |  |
| --- | --- | --- | --- |
| Line | Variable count | Condition count!=0 | Output |
| 2 | 5 |  |  |
| 3 |  | True |  |
| 4 |  |  | 5 |
| 5 | 4 |  |  |
| 3 |  | True |  |
| 4 |  |  | 3 |
| 5 | 3 |  |  |
| 3 |  | True |  |
| 4 |  |  | 2 |
| 5 | 1 |  |  |
| 3 |  | True |  |
| 4 |  |  | 0 |
| 5 | 0 |  |  |
| 3 |  | False |  |
| 4 |  |  | sleep(1) |
| 5 |  |  |  |
| 3 |  |  |  |

**While loop 2**

|  |  |
| --- | --- |
| 1  2  3  4 | number = 2  while number < 11:  print(number)  number = number + 2 |

**Complete the table:**

|  |  |  |  |
| --- | --- | --- | --- |
| Line | Variable number | Condition number < 11 | Output |
| 1 | 2 |  |  |
| 2 |  | True |  |
| 3 |  |  | 2 |
| 4 | 4 |  |  |
| 2 |  | True |  |
| 3 |  |  | 4 |
| 4 | 6 |  |  |
| 2 |  | True |  |
| 3 |  |  | 6 |
| 4 | 8 |  |  |
| 2 |  | True |  |
| 3 |  |  | 8 |
| 4 | 10 |  |  |
| 2 |  | True |  |
| 3 |  |  | 10 |
| 4 | 12 |  |  |
| 2 |  | False |  |

**While loop 3**

Based on Euclid's algorithm for calculating the greatest common factor of two integers.

|  |  |
| --- | --- |
| 1  2  3  4  5  6  7  8  9  10 | a = 21  b = 15  while a != b:  if a < b:  b = b-a  else:  a = a-b  print(a) |

**Complete the table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Variable | | Condition | |  |
| Line | a | b | a != b | a < b | Output |
| 1 | 21 |  |  |  |  |
| 2 |  | 15 |  |  |  |
| 4 |  |  | True |  |  |
| 5 |  |  |  | False |  |
| 8 |  |  |  |  | 6 |
| 4 | 6 |  |  |  |  |
| 5 |  | 15 |  |  |  |
| 6 |  |  | True |  |  |
| 4 |  |  |  | True |  |
| 5 |  |  |  |  | 9 |
| 6 | 6 |  |  |  |  |
| 4 |  | 9 |  |  |  |
| 5 |  |  | True |  |  |
| 8 |  |  |  | True |  |
| 4 |  |  |  |  | 3 |
| 10 |  |  |  |  |  |

Detect and correct the errors .

**A while loop with an error**

This while loop has been designed to print the 5 times table, up to 25. Use a trace table to see how the code currently executes. When you spot the error, rewrite the code in the space provided on the next page.

|  |  |
| --- | --- |
| 1  2  3  4  5 | number = 1  while number != 25:  number = number + 5  print(number) |

**Complete the table:**

|  |  |  |  |
| --- | --- | --- | --- |
| Line | Variable number | Condition number != 25 | Output |
| 1 | 1 |  |  |
| 3 |  | True |  |
| 4 |  |  | 6 |
| 5 | 6 |  |  |
| 3 |  | True |  |
| 4 |  |  | 11 |
| 5 | 11 |  |  |
| 3 |  | True |  |
| 4 |  |  | 16 |
| 5 | 16 |  |  |
| 3 |  | True |  |
| 4 |  |  | 21 |
| 5 | 21 |  |  |
| 3 |  | True |  |
| 4 |  |  | **26** |
| 5 | **26** |  |  |
| 3 |  | **True** |  |

**Correct the code and rewrite it in the box below:**

|  |  |
| --- | --- |
| 1  2  3  4  5 | number = 1  while number <= 25:  number = number + 5  print(number) |

**Check that you are correct by completing the table:**

|  |  |  |  |
| --- | --- | --- | --- |
| Line | Variable number | Condition number != 25 | Output |
| 1 | 1 |  |  |
| 3 |  | True |  |
| 4 |  |  | 6 |
| 5 | 6 |  |  |
| 3 |  | True |  |
| 4 |  |  | 11 |
| 5 | 11 |  |  |
| 3 |  | True |  |
| 4 |  |  | 16 |
| 5 | 16 |  |  |
| 3 |  | True |  |
| 4 |  |  | 21 |
| 5 | 21 |  |  |
| 3 |  | True |  |
| 4 |  |  | 26 |
| 5 | 26 |  |  |
| 3 |  | False |  |

Explorer task .

This program will display the prime factors for a number. It checks if number is perfectly divisible by the factor. Alternatively, it checks if factor divides the number.

|  |  |
| --- | --- |
| 1  2  3  4  5  6  7  8  9 | number = 15  factor = 2  while number > 1:  if number % factor == 0:  print(factor)  number = number // factor  else:  factor = factor + 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Variable | | Condition | |  |
| Line | number | factor | number > 1 | number % factor == 0 | Output |
| 1 | 15 |  |  |  |  |
| 2 |  | 2 |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 9 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 9 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 9 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  |  |  |  |
| 4 |  |  |  |  |  |