CODE CHALLENGE WORKED EXAMPLE: FACTORIAL FINDER

For each challenge, solve it using:

• A flowchart
• Program code (any high level language will do).

The challenge: Factorial Finder

The Factorial of a positive integer, n, is defined as the product of the sequence n, n-1, n-2, ...1.

Note that the factorial of 0 is 1.

Solve this using loops and then by recursion.

The flowchart:

Start

User number

f1

does num = 0?

Yes → return 1

No

return num * f1(num-1)

End
Pseudocode:

<table>
<thead>
<tr>
<th>Pseudocode</th>
<th>Explanation</th>
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| ```python
def factorialRec(num):
    if num == 0:
        return 1
    else:
        return num * factorialRec(num - 1)
```                     | 1. 0 factorial is 1
|                                                                 | 2. In the return statement we are calling the factorialRec function again, which is why we say this is using recursion |

Program code (with comments):

```python
def main():
    print factorialRec(0)
    print factorialRec(10)
    print factorialLoop(0)
    print factorialLoop(10)

def factorialRec(num):
    # Recursive
    if num == 0:
        return 1
    else:
        # i.e. We re-use the function in the function - this is recursion
        return num * factorialRec(num - 1)

def factorialLoop(num):
    # Loop
    factorial = 1
    # factorial of 0 is 1
    if num == 0:
        return 1
    for i in range(1, num + 1):
        factorial *= 1
    return factorial```