CSCA08H Winter 2022 Worksheet: While Loops

1. In the boxes below, fill in the missing code that will make the function definition match its description.

```
def every_nth_character(s: str, n: int) -> str:
    """Return a string that contains every nth character from s, starting at index 0.

    Precondition: n > 0

    >>> every_nth_character('Computer Science', 3)
    'CpeSee'
    """

    result = ''
    i = 0  # The index of the next character to examine.

    while [                              ]:

        result = result + s[i]

        i = [                              ]

    return result
```

2. In the boxes below, fill in the missing code that will make the function definition match its description.

```
def find_letter_n_times(s: str, letter: str, n: int) -> str:
    """Return the smallest substring of s starting from index 0 that contains
    n occurrences of letter.

    Precondition: letter occurs at least n times in s

    >>> find_letter_n_times('Computer Science', 'e', 2)
    'Computer Scie'
    """

    i = 0  # The index of the next character to examine.
    count = 0  # The number of occurrences of letter in s[:i].

    while [                              ]:
        if [                              ]:
            count = count + 1
        i = i + 1

    return [                              ]
```

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3. In math, the Collatz conjecture states that starting from any positive integer, you will eventually reach the number 1 by repeatedly applying the following two rules:

   - if the number is even, divide it by 2 to get the next number in the sequence
   - if the number is odd, multiply by 3 and add 1 to get the next number in the sequence

   Repeatedly applying the rules generates a sequence of numbers. The Collatz step count is the number of applications of the rules required before the sequence reaches 1. For example, there are 8 Collatz steps in the Collatz sequence:
   `n = 6 -> n = 3 -> n = 10 -> n = 5 -> n = 16 -> n = 8 -> n = 4 -> n = 2 -> n = 1`

   Complete this function to count the Collatz steps for a particular number n.

```
def count_collatz_steps(n: int) -> int:
    """Return the number of steps it takes to reach 1 by applying the two rules
    of the Collatz conjecture beginning from the positive integer n.

    Precondition: n >= 1

    >>> count_collatz_steps(6)
    8
    """
```

4. The function below has an incomplete header and docstring. Based on the code in the function body, fill in the missing parts: the Header (including the Type Contract), Description, and Examples.

```
def                                    :
    """
    """

    i = 0

    while i < len(s) and s[i] not in '0123456789':
        i = i + 1
    return i
```