

**SR UNIVERSITY**  
**AI ASSISTED CODING**

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**Lab 10: Code Review and Quality: Using AI to improve code quality and readability**

**Lab Objectives:**

- To understand the importance of code readability, maintainability, and quality.
- To explore how AI-assisted coding tools can review code and suggest improvements.
- To practice identifying code smells, redundant code, and poor naming conventions.
- To apply AI tools for refactoring and improving readability.
- To critically evaluate AI feedback and integrate it into real projects

**Lab Outcomes (LOs):**

After completing this lab, students will be able to:

- Use AI-assisted tools (e.g., GitHub Copilot, Cursor AI) to review Python code.
- Identify and correct syntax issues, code smells, and inefficient logic.
- Improve readability by applying consistent formatting, naming, and comments.
- Refactor code with AI suggestions while ensuring functionality is preserved.
- Apply best practices for writing clean, maintainable, and professional code.

**Task Description#1 AI-Assisted Code Review (Basic Errors):**

- Write python program as shown below.
- Use an AI assistant to review and suggest corrections.

Given program to ai which was manually written:

```

palindrome_tests.py > ...
1  def calcFact(n) :
2  result=1
3  x=0
4  for i in range(1,n): result=result*i
5  return result
6  def main():
7  num = 5
8  FACT = calcFact (num)
9  print("the factorial of",num,"is" ,FACT)
10 t=10
11 if FACT>10:
12 print("BIG Number")
13 else:
14 print ("small number")
15 main

```

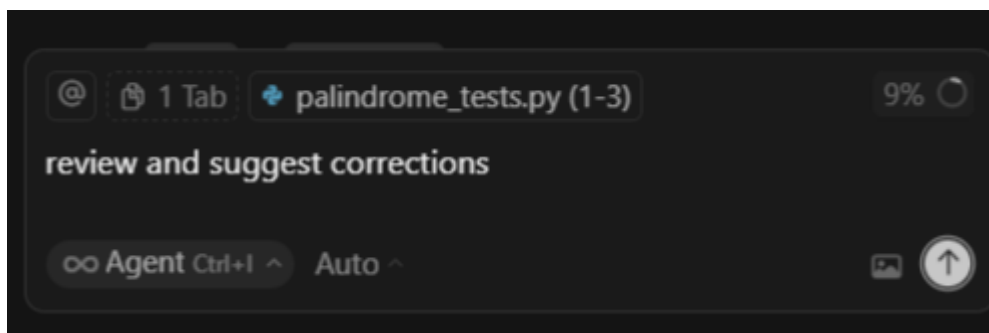
Output:

```

PS C:\Users\musta\.cursor> & C:/Users/musta/AppData/Local/Programs/Python/Python313/python.exe c:/Users/musta/.cursor/palindrome_tests.py
File "c:\Users\musta\.cursor\palindrome_tests.py", line 2
    result=1
    ^^^^^^
IndentationError: expected an indented block after function definition on line 1
PS C:\Users\musta\.cursor>

```

Given prompt to AI:



Given program by AI:

```

palindrome_tests.py > ...
1  def calcFact(n):
2      """
3      Calculate the factorial of a number.
4
5      Args:
6      |   n (int): The number to calculate factorial for
7
8      Returns:
9      |   int: The factorial of n
10     """
11     if n < 0:
12         raise ValueError("Factorial is not defined for negative numbers")
13     if n == 0 or n == 1:
14         return 1
15
16     result = 1
17     for i in range(1, n + 1): # Fixed: added +1 to include n
18         result = result * i
19     return result
20
21
22 def main():
23     """Main function to demonstrate factorial calculation."""
24     num = 5
25     fact = calcFact(num)
26     print("The factorial of", num, "is", fact)
27
28     threshold = 10
29     if fact > threshold:
30         print("BIG Number")
31     else:
32         print("Small number")
33

```

```

palindrome_tests.py > ...
21
22 def main():
23     """Main function to demonstrate factorial calculation."""
24     num = 5
25     fact = calcFact(num)
26     print("The factorial of", num, "is", fact)
27
28     threshold = 10
29     if fact > threshold:
30         print("BIG Number")
31     else:
32         print("Small number")
33
34
35 if __name__ == "__main__":
36     main()

```

Output:

```
Problems Output Debug Console Terminal Ports
PS C:\Users\musta\.cursor> & C:/Users/musta/AppData/Local/Programs/Python/Python313/python.exe c:/Users/musta/.cursor/palindrome_tests.py
.ccursor/palindrome_tests.py
The factorial of 5 is 120
BIG Number
The factorial of 5 is 120
BIG Number
BIG Number
PS C:\Users\musta\.cursor>
```

### Observation:

AI corrected the loop range to include n for proper factorial calculation.

It fixed indentation and removed the unused variable.

It also corrected the missing parenthesis in the main() call so the program runs correctly.

### Task Description#2 Automatic Inline Comments:

- Write the Python code for Fibonacci as shown below and execute.
- Ask AI to improve variable names, add comments, and apply PEP8 formatting (cleaned up).
- Students evaluate which suggestions improve readability most. one

### Given manually written program to AI:

```
palindrome_tests.py > ...
1  def f1(xx):
2      a=0
3      b=1
4      c=2
5      Zz=[a,b]
6      while c<xx:
7          d=a+b
8          Zz.append(d)
9          a=b
10         b=d
11         C=c+1
12     return Zz
13 def m():
14     NN=10
15     ans=f1(NN)
16     print("fib series till",NN,":",ans)
17     m()
```

## Output:

```
PS C:\Users\musta\.cursor> & C:/Users/musta/AppData/Local/Programs/Python/Python313/python.exe c:/Users/musta/.cursor/palindrome_tests.py
File "c:\Users\musta\.cursor\palindrome_tests.py", line 6
    while c<=xX:
          ^
SyntaxError: invalid character 'x' (U+2039)
PS C:\Users\musta\.cursor>
```

## Given prompt:

improve variable names, add comments, and apply PEP8 formatting (cleaned up).

## Given program by AI:

```
palindrome_tests.py > ...
1  def generate_fibonacci_sequence(sequence_length):
2      """
3          Generate a Fibonacci sequence up to the specified length.
4
5          The Fibonacci sequence is a series of numbers where each number is the sum
6          of the two preceding ones, starting from 0 and 1.
7
8          Args:
9              sequence_length (int): The number of terms to generate in the sequence
10
11          Returns:
12              list: A list containing the Fibonacci sequence
13      """
14      # Handle edge cases
15      if sequence_length <= 0:
16          return []
17      elif sequence_length == 1:
18          return [0]
19      elif sequence_length == 2:
20          return [0, 1]
21
22      # Initialize the first two Fibonacci numbers
23      previous_term = 0
24      current_term = 1
25      term_count = 2 # We already have 2 terms
26
27      # Initialize the sequence with the first two terms
28      fibonacci_sequence = [previous_term, current_term]
29
30      # Generate the remaining terms
31      while term_count < sequence_length:
32          # Calculate the next Fibonacci number
33          next_term = previous_term + current_term
```

```
palindrome_tests.py > ...
1  def generate_fibonacci_sequence(sequence_length):
34
35      # Add the new term to the sequence
36      fibonacci_sequence.append(next_term)
37
38      # Update variables for the next iteration
39      previous_term = current_term
40      current_term = next_term
41      term_count += 1
42
43      return fibonacci_sequence
44
45
46 def main():
47     """
48     Main function to demonstrate the Fibonacci sequence generation.
49
50     This function generates a Fibonacci sequence of 10 terms and displays it.
51     """
52     # Set the desired sequence length
53     sequence_length = 10
54
55     # Generate the Fibonacci sequence
56     fibonacci_result = generate_fibonacci_sequence(sequence_length)
57
58     # Display the result
59     print("Fibonacci series till", sequence_length, ":", fibonacci_result)
60
61
62 if __name__ == "__main__":
63     main()
```

## Output:

```
Problems  Output  Debug Console  Terminal  Ports
PS C:\Users\musta\.cursor> & C:/Users/musta/AppData/Local/Programs/Python/Python313/python.exe c:/Users/musta/
.cursor/palindrome_tests.py
Fibonacci series till 10 : [0, 1, 1, 2, 3, 5, 8, 13, 21, 34]
PS C:\Users\musta\.cursor>
```

## Observation:

AI improved the variable names to make the code more readable and meaningful.

It applied PEP8 formatting with proper indentation and spacing.

It also added comments and a docstring to clearly explain the function and its purpose.

### Task Description#3

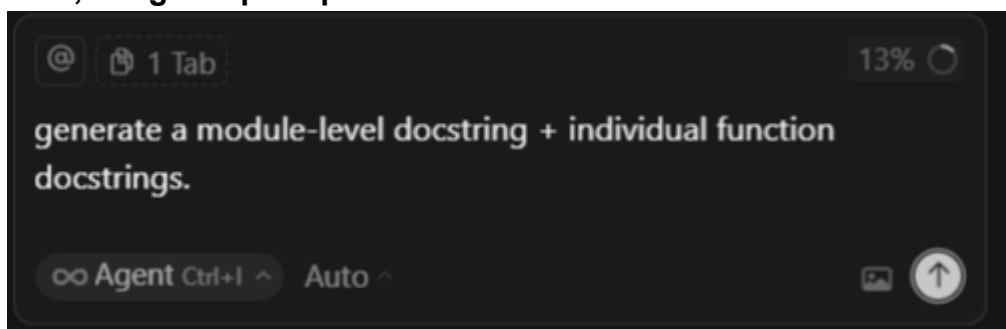
- Write a Python script with 3–4 functions (e.g., calculator: add, subtract, multiply, divide).
- Incorporate manual **docstring** in code with NumPy Style
- Use AI assistance to generate a module-level docstring + individual function docstrings.
- Compare the AI-generated docstring with your manually written one.

Given program with multiple functions and manual docstring in code:

```
palindrome_tests.py > divide
1  def add(a, b):
2      """
3      Add two numbers.
4      Parameters
5      -----
6      a : int or float
7      |   First number.
8      b : int or float
9      |   Second number.
10     Returns
11     -----
12     int or float
13     |   The result of a + b.
14     """
15     return a + b
16  def subtract(a, b):
17      """
18      Subtract b from a.
19      Parameters
20      -----
21      a : int or float
22      |   Number from which another number is subtracted.
23      b : int or float
24      |   Number to subtract.
25      Returns
26      -----
27      int or float
28      |   The result of a - b.
29      """
30     return a - b
31  def multiply(a, b):
32      """
33      Multiply two numbers.
34      Parameters
35      -----
36      a : int or float
37      |   First number.
```

```
palindrome_tests.py > divide
31 def multiply(a, b):
32     """
33     a : int or float
34     | First number.
35     b : int or float
36     | Second number.
37     Returns
38     -----
39     int or float
40     | The result of a * b.
41     """
42     return a * b
43
44 def divide(a, b):
45     """
46     Divide a by b.
47     Parameters
48     -----
49     a : int or float
50     | Numerator (the number to be divided).
51     b : int or float
52     | Denominator (should not be zero).
53     Returns
54     -----
55     float
56     | The result of a / b.
57     Raises
58     -----
59     ZeroDivisionError
60     | If b is zero.
61     """
62     return a / b
```

Now, the given prompt to the AI:





## Given code by AI:

```
palindrome_tests.py > divide
1  """
2  Basic Calculator Module
3
4  This module provides fundamental arithmetic operations including addition,
5  subtraction, multiplication, and division. All functions support both integer
6  and floating-point number inputs and return appropriate numeric types.
7
8  The module is designed to be simple and straightforward, making it suitable
9  for basic mathematical calculations and educational purposes.
10
11  Functions
12  -----
13  add(a, b)
14      Add two numbers together
15  subtract(a, b)
16      Subtract the second number from the first
17  multiply(a, b)
18      Multiply two numbers
19  divide(a, b)
20      Divide the first number by the second
21
22  Examples
23  -----
24  >>> from palindrome_tests import add, subtract, multiply, divide
25  >>> add(5, 3)
26  8
27  >>> subtract(10, 4)
28  6
29  >>> multiply(3, 7)
30  21
31  >>> divide(15, 3)
32  5.0
^ 1 / 19 ^ Undo all Ctrl+Shift+Q8 Keep all Ctrl+Q
```

```
palindrome_tests.py > divide
33
34  Notes
35  -----
36  - All functions accept both int and float types
37  - Division always returns a float, even when dividing integers
38  - Division by zero will raise a ZeroDivisionError
39
40  Author
41  -----
42  Generated by AI Assistant
43
44  Version
45  -----
46  1.0.0
47  """
48
49
50  def add(a, b):
51      """
52      Add two numbers.
53      Add two numbers together.
54
55      This function performs basic addition of two numeric values.
56
57      Parameters
58      -----
59      a : int or float
60          First number.
61          The first number to add
62      b : int or float
63          Second number.
64          The second number to add
65
66      Returns
67      -----
68      int or float
69          The result of a + b.
^ 2 / 19 ^ Undo all Ctrl+Shift+Q8 Keep all Ctrl+Q
```

```
palindrome_tests.py > divide
79 def subtract(a, b):
97
98     Examples
99     -----
100     >>> subtract(10, 3)
101     7
102     >>> subtract(5.5, 2.3)
103     3.2
104     >>> subtract(8, 2.0)
105     6.0
106     """
107     return a - b
108 def multiply(a, b):
109     """
110     Multiply two numbers.
111     Multiply two numbers together.
112
113     This function performs basic multiplication of two numeric values.
114
115     Parameters
116     -----
117     a : int or float
118         First number.
119         The first number to multiply (multiplicand)
120     b : int or float
121         Second number.
122         The second number to multiply (multiplier)
123
124     Returns
125     -----
126     int or float
127         The result of a * b.
128         The product of a and b. Returns int if both inputs are int,
129         otherwise returns float
130
131     Examples
132     -----
133     >>> multiply(10, 3)
134     30
135     >>> multiply(5.5, 2.3)
136     12.65
137     >>> multiply(8, 2.0)
138     16.0
139     """
140     return a * b
```

```
palindrome_tests.py > divide
50 def add(a, b):
66     """
67     The sum of a and b. Returns int if both inputs are int,
68     otherwise returns float
69
70     Examples
71     -----
72     >>> add(2, 3)
73     5
74     >>> add(2.5, 3.7)
75     6.2
76     >>> add(5, 2.0)
77     7.0
78     """
79     return a + b
80
81 def subtract(a, b):
82     """
83     Subtract b from a.
84     Subtract the second number from the first.
85
86     This function performs basic subtraction: a - b.
87
88     Parameters
89     -----
90     a : int or float
91         Number from which another number is subtracted.
92         The number from which to subtract (minuend)
93     b : int or float
94         Number to subtract.
95         The number to subtract (subtrahend)
96
97     Returns
98     -----
99     int or float
100     The result of a - b.
101     The difference of a and b
102     otherwise returns float
```

```
palindrome_tests.py > divide
108 def multiply(a, b):
135     """
136     return a * b
137 def divide(a, b):
138     """
139     Divide a by b.
140     Divide the first number by the second.
141
142     This function performs basic division: a / b.
143
144     Parameters
145     -----
146     a : int or float
147         Numerator (the number to be divided).
148         The numerator (dividend) - the number to be divided
149     b : int or float
150         Denominator (should not be zero).
151         The denominator (divisor) - must not be zero
152
153     Returns
154     -----
155     float
156         The result of a / b.
157         The quotient of a and b. Always returns float, even when
158         dividing integers
159
160     Raises
161     -----
162     ZeroDivisionError
163         If b is zero.
164         If b is zero (division by zero is not allowed)
165
166     Examples
167     -----
168     >>> divide(10, 2)
169     5.0
170     >>> divide(15, 3.0)
```

```
palindrome_tests.py > divide
137 def divide(a, b):
162     """
163     >>> divide(10, 2)
164     5.0
165     >>> divide(15, 3.0)
166     5.0
167     >>> divide(7, 2)
168     3.5
169     >>> divide(5, 0)
170     ZeroDivisionError: division by zero
171
172     """
173     if b == 0:
174         raise ZeroDivisionError("division by zero")
175     return a / b
```

Comparison:

### AI-Generated Docstring:

- Very formal and polished.
- Uses full sentences like *"This module provides basic arithmetic operations..."*.
- Adds sections like *Functions* with descriptions.
- Looks professional but can feel a bit too "perfect" or lengthy.

### Manually Written Docstring:

- Shorter and to the point.
- Uses simple wording like *“Add two numbers”*, *“Subtract  $b$  from  $a$ ”*.
- Easier to read and less formal.
- More in line with how a student would normally explain code.