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EXPERIMENT NO: 8

CODE:

```
# First Pass - Identifying and storing macros
macro_table = {}    # Dictionary to store macro definitions
with open('input.txt', 'r') as file:
    line_count = 0
    for line in file:
        line_count += 1
        tokens = line.strip().split(' ')
        if tokens[0] == 'MACRO':
            macro_name = tokens[1]
            parameters = tokens[2:]
            macro_definition = []
            line = file.readline().strip()
            while line != 'MEND':
                macro_definition.append(line)
                line = file.readline().strip()
            macro_table[macro_name] = (parameters, macro_definition)

# Second Pass - Expanding macros
output = []
with open('input.txt', 'r') as file:
    line_count = 0
    for line in file:
        line_count += 1
        tokens = line.strip().split(' ')
```

```
        if tokens[0] == 'MACRO':
            continue    # Skip macro definition lines
        elif tokens[0] in macro_table:
            # Expand macro definition
            parameters, macro_definition = macro_table[tokens[0]]
            parameter_values = tokens[1:]
            if len(parameter_values) != len(parameters):
                raise Exception(f'Error: Number of parameters does not match at line {line_count}')
            for i in range(len(parameters)):
                macro_definition = [x.replace(parameters[i], parameter_values[i]) for x in macro_definition]
            output.extend(macro_definition)
        else:
            # Non-macro line, add to output
            output.append(line.strip())

# Print output and data structures used
print('Output:')
for line in output:
    print(line)

print('Macro Table:')
for macro_name in macro_table:
    parameters, macro_definition = macro_table[macro_name]
    print(f'{macro_name}: {parameters} {macro_definition}')
```

INPUT FILE:

```
MACRO ADD NUM1, NUM2
MOV AX, NUM1
ADD AX, NUM2
MOV RESULT, AX
MEND

MACRO SUBTRACT NUM1, NUM2
MOV AX, NUM1
SUB AX, NUM2
MOV RESULT, AX
MEND

START
ADD 10, 20
SUBTRACT 50, 30
END
```

OUTPUT:

```
Output:
MOV AX, NUM1
MOV AX, NUM1
ADD AX, NUM2
MOV RESULT, AX
MOV RESULT, AX
MEND

MOV AX, NUM1
SUB AX, NUM2
MOV RESULT, AX
MEND

START
MOV AX, NUM1
ADD AX, 20
MOV RESULT, AX
MOV AX, NUM1
SUB AX, 30
MOV RESULT, AX
END
Macro Table:
ADD: ['NUM1,', 'NUM2'] ['MOV AX, NUM1', 'ADD AX, NUM2', 'MOV RESULT, AX']
SUBTRACT: ['NUM1,', 'NUM2'] ['MOV AX, NUM1', 'SUB AX, NUM2', 'MOV RESULT, AX']
```