Kanyawat Raksawin 64011421

Phattarada Limsuchaiwat 64011547

LABORATORY 1 : Flowchart / Pseudocode / Test cases

OBJECTIVES

- to understand how to express thoughts/algorithms in flowchart and pseudocode
- to be able to write test cases for simple programs

LABORATORY 1: Pre-lab, In-lab, Post-lab

Work in pair

For each scenario,

1. write a flowchart
2. write a pseudocode
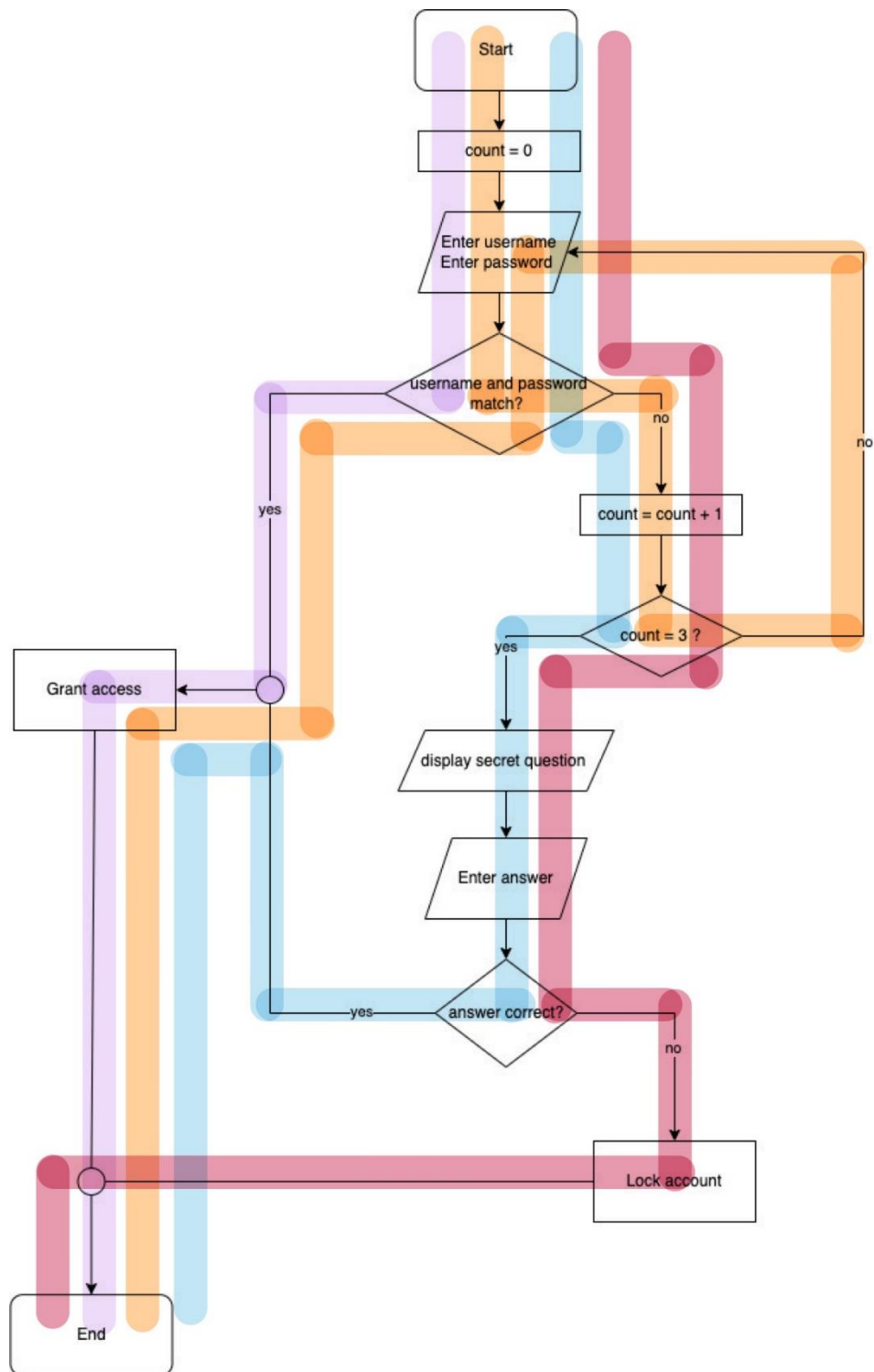3. design test cases

    indicate type (or types) of coverage (statement, branch, condition or path) given by your

test cases

Scenarios

1. Login attempt

- username and password are required to login
- only when username and password are matched, an access is granted
- secret question is asked after the 3rd unsuccessful login attempts
- if the answer to the secret question is correct, an access is granted and the login info (username and password) is sent to user's email.

Flowchart

```
Start
  |
  v
count = 0
  |
  v
Enter username
Enter password  <-------------------+
  |                                 |
  v                                 |
username and password              no
match?  ------- no ------+           |
  |                      |           |
 yes                     v           |
  |              count = count + 1   |
  |                      |           |
  |                      v           |
  |              count = 3 ? ---- no +
  |                      |
  |                     yes
  |                      |
  |                      v
  |             display secret question
  |                      |
  |                      v
  |               Enter answer
  |                      |
  |                      v
  +----(o)----> answer correct? ---- no ----+
  |      |          |                        |
  |      |         yes                        v
  |   Grant access                      Lock account
  |      |                                    |
  |      |                                    |
  +--(o)-+------------------------------------+
         |
         v
        End
```

Pseudocode

Set count = 0

Enter username and password

Is username and password match?

    If yes, then

        Grant access

    else

        Increment count by 1

        Is count = 3?

        If no, then go to line 2

        Else

            Show secret question

            Enter answer

            Is answer, correct?

                If yes, then

                    Grant access

                Else

                    Lock account

Test case

Test case	Inputs	Expected results	Coverage
Username and password matched	Correct username and password	Grant access	Line = 1-5
Username and password not matched within 3 times	Correct username, wrong password Wrong username, correct password Correct username and password	Grant access	Line = 1-9

Username and password not matched more than 3 times and correct secret question	Correct username, wrong password Wrong username, correct password Wrong username, wrong password Correct answer for secret question	Grant access	Line = 1-15
Username and password not matched more than 3 times and incorrect secret question	Correct username, wrong password Wrong username, correct password Wrong username, wrong password Wrong answer for secret question	Lock account	Line = 1-17

2. Money transfer

- transfer money from account A to account B
- fee is charged according to the following rules
    o same bank : transferred amount > THB10,000, fee 1%
    o different bank : fee THB50 + 1%

Flowchart
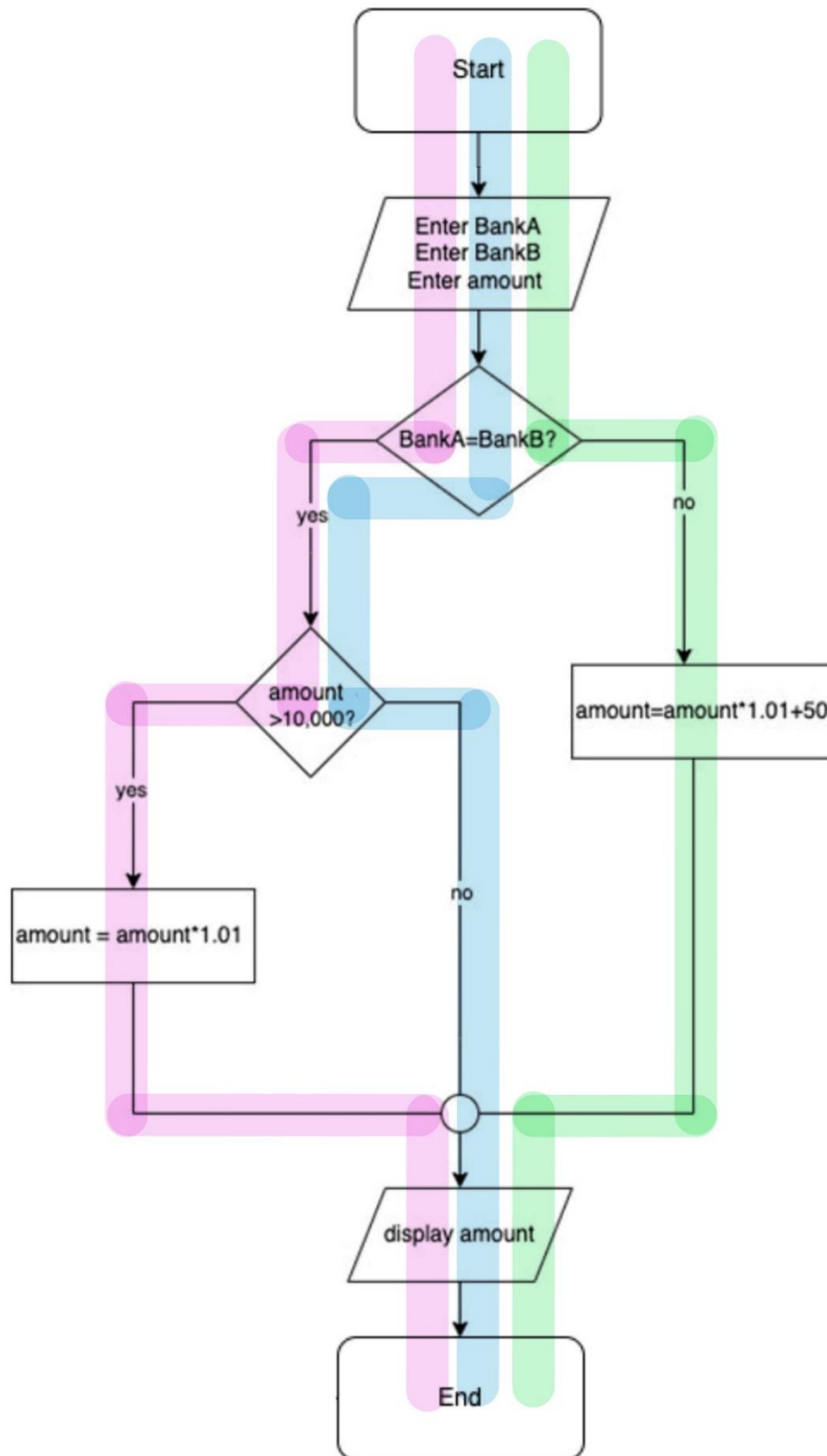
Pseudocode

Enter BankA, BankB and amount

Is BankA = BankB?

    If no, then

        Amount = amount * 1.01 + 50

    Else

        Is amount > 10,000?

            If yes, then

                amount = amount * 1.01

            Else

                No change

    Display amount

Test case

Test case	Inputs	Expected results	Coverage
Money transfer between same bank and the amount are more than 10,000	$11,000	Amount = 11,110	Line = 1-8, 11
Money transfer between same bank and the amount are less than 10,000	$9,000	Amount = 9,000	Line = 1-11
Money transfer between different bank	$3,000	Amount = 3,080	Line = 1-4, 11

3. Sales promotion

SAMPLE OF A SALES PROMOTION POLICY

- Preferred customers who order more than $1,000 are entitled to a 5% discount, and an additional 5% discount if they used our charge card.
- Preferred customers who do not order more than $1,000 receive a $25 bonus coupon.
- All other customers receive a $5 bonus coupon.

Flowchart
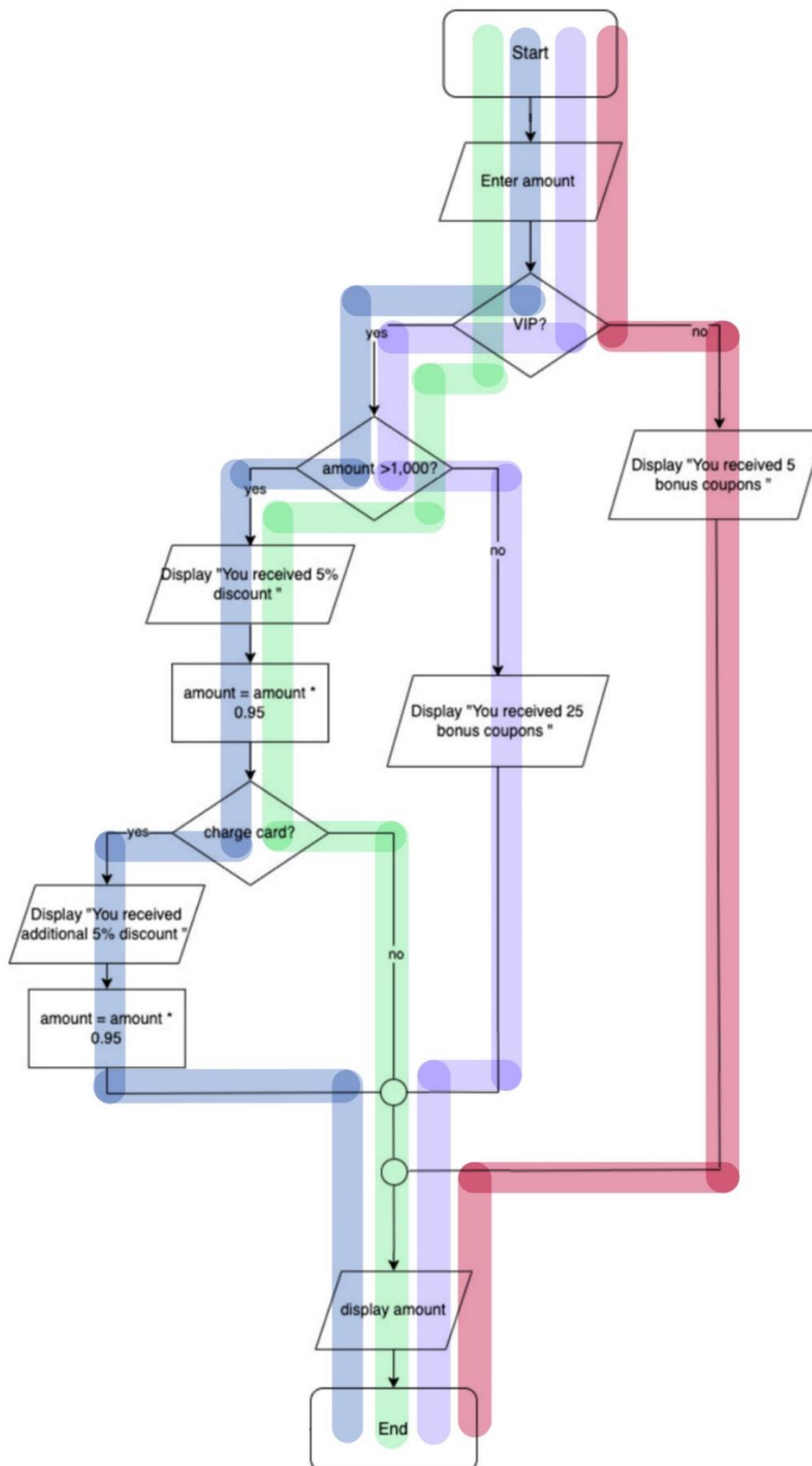
Pseudocode

Enter the amount

Is customer a VIP?

    If no, then

        Display "You received 5 bonus coupons"

    Else

        Is amount > 1,000?

            If no, then

                Display "You received 25 bonus coupons"

            Else

                Display "You received 5% discount"

                amount = amount * 0.95

                    Is customer used charge card?

                    If yes, then

                        Display "You received additional 5% discount"

                        amount = amount * 0.95

                    Else

                        No change

Display amount

Test case

Test case	Inputs	Expected results	Coverage
Customers are not VIP	$200	"You received 5 bonus coupons" Amount = 200	Line 1-4, 18
Customers are VIP Amounts are less than $1000	$900	"You received 25 bonus coupons" Amount = 900	Line 1-8, 18

Customers are VIP Amounts are more than $1000 Customer used charge card	$1200	"You received 5% discount" "You received additional 5% discount" Amount = 1,083	Line 1-15, 18
Customers are VIP Amounts are more than $1000 Customer used no charge card	$1200	"You received 5% discount" Amount = 1,140	Line 1-18

4. Find all pairs of numbers in a given list that sum to a given value

Example:

[1, 2, 3, 4, 5] sum = 6

result: [1, 5] , [2, 4]

Flowchart

```
                    Start
                      |
                      v
                 Enter list
                 Enter sum
                      |
                      v
                   i = 0
                      |
                      v
         no    Is i less than
       <-------length of list?------+
       |              |             |
       v             yes            |
      End             |             |
                      v             |
                   j = i + 1        |
                      |             |
                      v             |
              Is j less than        |
       +------length of list?-------+
       |              |             |
       |             yes            |
       |              v             |
       |      list [i] + list [j] = sum?
       |       |              |
       |      no             yes
       |       |              v
       |       |      print(list [i], list [j])
       |       |              |
       |       v              |
       +----> (o) <-----------+
               |
               v
            j = j + 1
               |
               v           no
            i = i + 1 <-----+
```
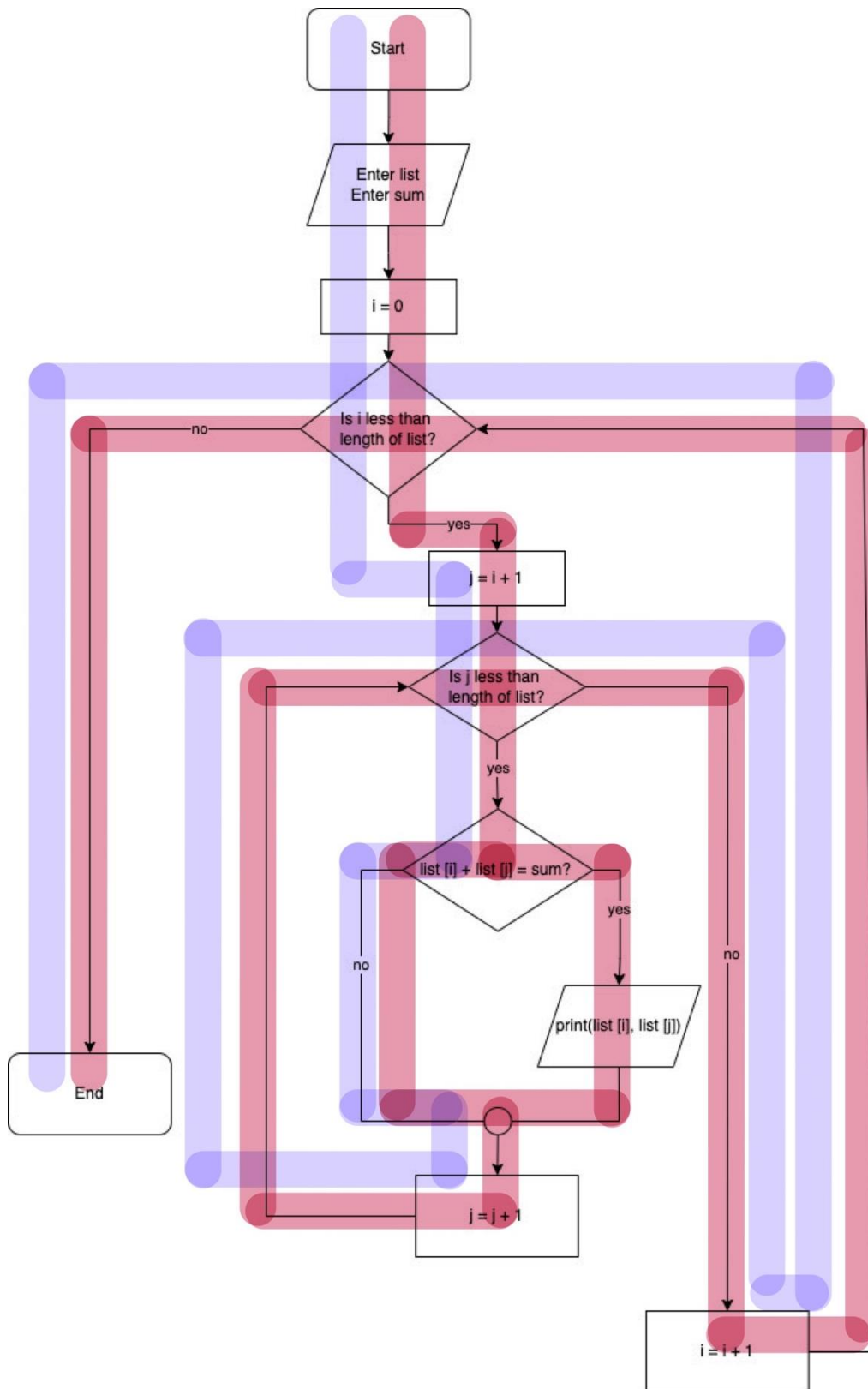
Pseudocode

Enter a list of number and sum value

Set i=0

Is i less than length of list?

If no, then

Go out of the loop

Else

Set j = i + 1

Is j less than length of list?

If no, then

Increment i by 1

go to step 3

else

Check whether list[i] + list[j] = sum?

If yes, then

print list[i] and list[j]

Else

No change

Increment j by 1

Test case (The number can be used once.)

Test case	Inputs	Expected results	Coverage
There are pairs of numbers that their sum is equal to the sum of given number	list = [1, 2, 3, 4, 5] sum = 6	[1,5], [2,4]	Line = 1-19
No pairs of numbers that their sum is equal to the sum of given number	list = [1, 2, 3, 4, 5] sum = 11	No result	Line = 1-19

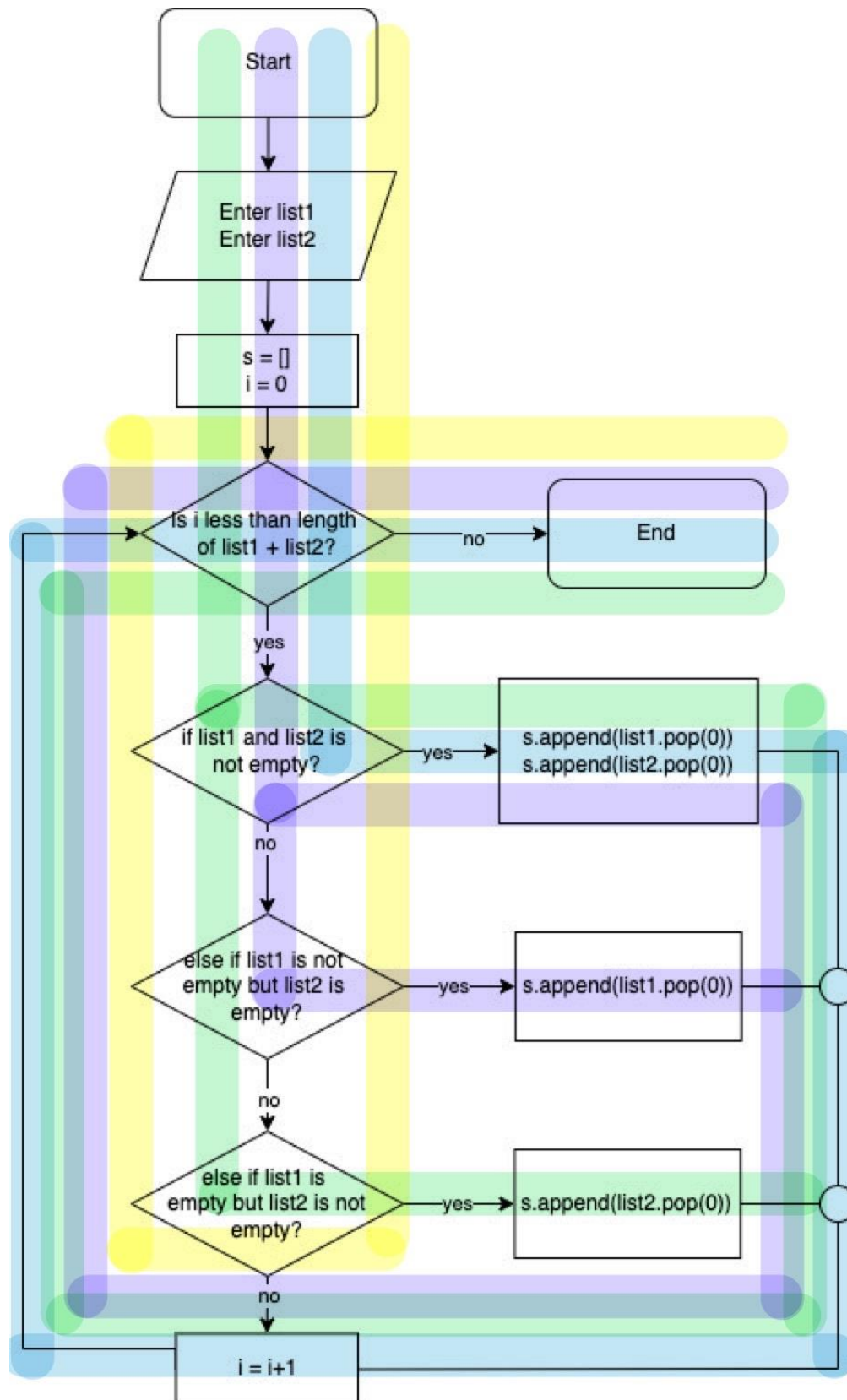5. Combine two lists by alternatingly taking elements

    Example:

        List 1 : [1, 2, 3]

        List 2 : [a, b, c]

        result : [1, a, 2, b, 3, c]

    Note that list lengths may differ

Flowchart

```
                    ┌──────────────┐
                    │    Start     │
                    └──────┬───────┘
                           │
                           ▼
                    ╱─────────────╲
                   ╱  Enter list1  ╲
                   ╲  Enter list2  ╱
                    ╲─────────────╱
                           │
                           ▼
                    ┌──────────────┐
                    │    s = []    │
                    │    i = 0     │
                    └──────┬───────┘
                           │
                           ▼
                    ◆─────────────◆
                   ╱ Is i less than ╲         no      ┌──────────────┐
                  ◆  length of       ◆───────────────▶│     End      │
                   ╲ list1 + list2? ╱                 └──────────────┘
                    ◆─────────────◆
                           │ yes
                           ▼
                    ◆─────────────◆            ┌───────────────────────────┐
                   ╱ if list1 and   ╲   yes    │ s.append(list1.pop(0))    │
                  ◆  list2 is not    ◆────────▶│ s.append(list2.pop(0))    │
                   ╲ empty?         ╱          └───────────────────────────┘
                    ◆─────────────◆
                           │ no
                           ▼
                    ◆─────────────◆
                   ╱ else if list1   ╲  yes    ┌───────────────────────────┐
                  ◆  is not empty     ◆───────▶│ s.append(list1.pop(0))    │──◯
                   ╲ but list2 is    ╱         └───────────────────────────┘
                    ◆ empty?        ◆
                           │ no
                           ▼
                    ◆─────────────◆
                   ╱ else if list1   ╲  yes    ┌───────────────────────────┐
                  ◆  is empty but     ◆───────▶│ s.append(list2.pop(0))    │──◯
                   ╲ list2 is not    ╱         └───────────────────────────┘
                    ◆ empty?        ◆
                           │ no
                           ▼
                    ┌──────────────┐
                    │   i = i+1    │
                    └──────────────┘
```

Pseudocode

Enter list1 and list2

Set s=[] and i=0

Is i less than length of list1 + list2

If yes, then

 If list1 and list 2 is not empty

 Remove the element in list 1 at index [0] in s using pop() and store it in s using append()

 Remove the element in list 2 at index [0] in s using pop() and store it in s using append()

 Else if list1 is not empty but list2 is empty

 Remove the element in list 1 at index [0] in s using pop() and store it in s using append()

 Else if list2 is not empty but list1 is empty

 Remove the element in list 2 at index [0] in s using pop() and store it in s using append()

Increment i by 1

Test case

Test case	Inputs	Expected results	Coverage
list1 is equal to list2	list1 = [1, 2, 3] list2 = [a, b, c]	s = [1, a, 2, b, 3, c]	Line 1-17
Amounts of element in list1 are more than amounts of element in list2	list1 = [1, 2, 3, 4, 5] list2 = [a, b, c]	s = [1, a, 2, b, 3, c, 4, 5]	Line 1-17
Amounts of element in list2 are more than amounts of element in list1	list1 = [1, 2, 3] list2 = [a, b, c, d, e]	s = [1, a, 2, b, 3, c, d, e]	Line 1-17

Both list1 and list2 are empty	list1 = [] list2 = []	s = []	Line 1-17

Submission:

via Canvas

details are posted in Canvas.

You are to review your work with the TAs during lab session.