EEE: 103

Computer Programming

L2: Algorithms & Flowcharts

Loop Problems

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Problem 1: Grade Determination Based on Marks

Problem Statement:

Determine the grade (A, B, C, or F) based on marks scored.

- Mark ≥ 80 → Grade = A
- Mark ≥ 60 → Grade = B
- Mark ≥ 50 → Grade = C
- Otherwise → Grade = F

Algorithm

Step 1: Start

Step 2: Declare variable: Mark

Step 3: Input Mark

Step 4: If Mark ≥ 80 then go to Step 5 else go to Step 6

Step 5: Print "Grade = A" and go to Step 11

Step 6: If Mark ≥ 60 then go to Step 7 else go to Step 8

Step 7: Print "Grade = B" and go to Step 11

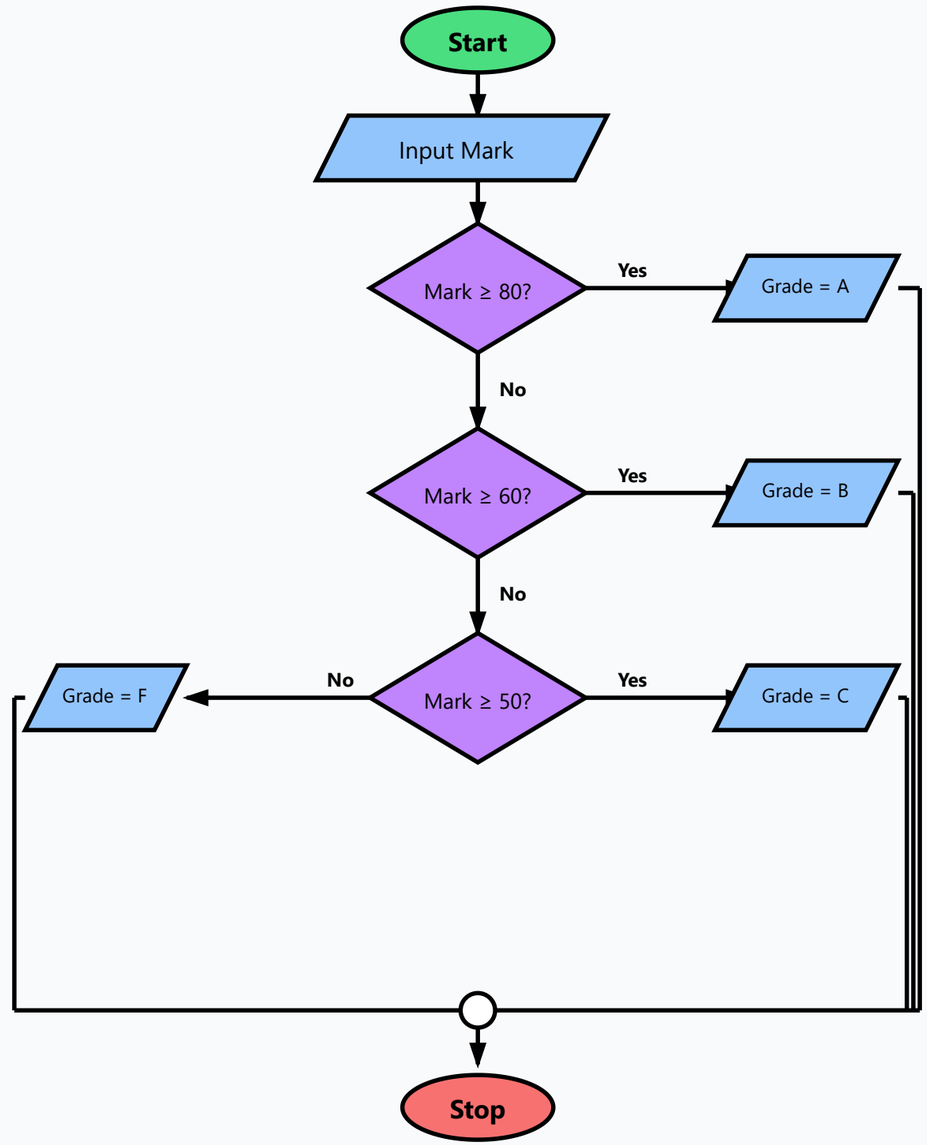
Step 8: If Mark ≥ 50 then go to Step 9 else go to Step 10

Step 9: Print "Grade = C" and go to Step 11

Step 10: Print "Grade = F"

Step 11: Stop

Flowchart



Problem 2: Minimum of Three Numbers

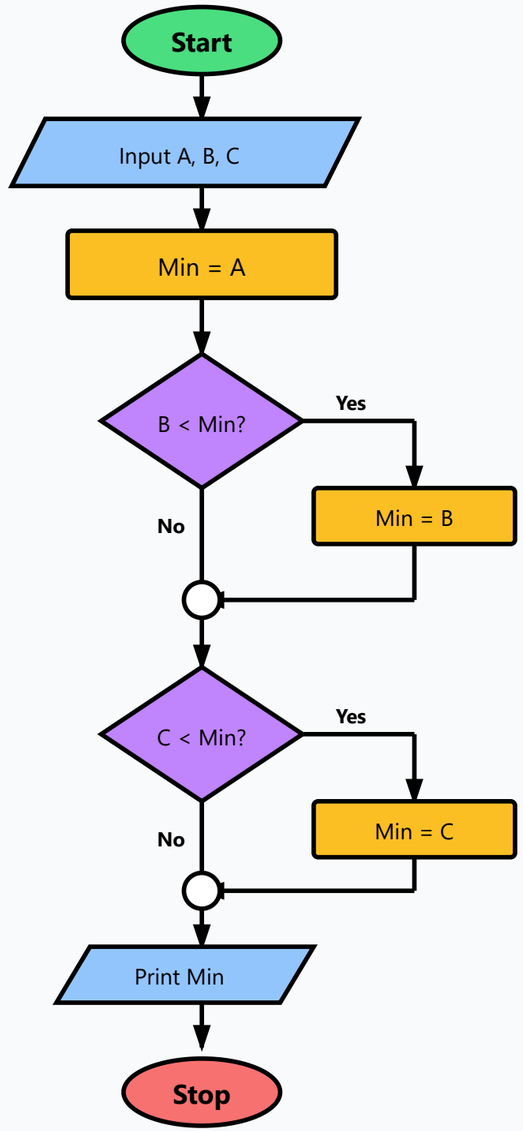
Problem Statement:

Find the minimum value among three numbers A, B, and C.

Algorithm

1. **Step 1:** Start
2. **Step 2:** Declare variables: A, B, C, Min
3. **Step 3:** Input A, B, C
4. **Step 4:** Set Min = A
5. **Step 5:** If B < Min then go to Step 6 else go to Step 7
6. **Step 6:** Set Min = B and go to Step 7
7. **Step 7:** If C < Min then go to Step 8 else go to Step 9
8. **Step 8:** Set Min = C and go to Step 9
9. **Step 9:** Print Min
10. **Step 10:** Stop

Flowchart



Problem 3: Print All Numbers from 1 to n

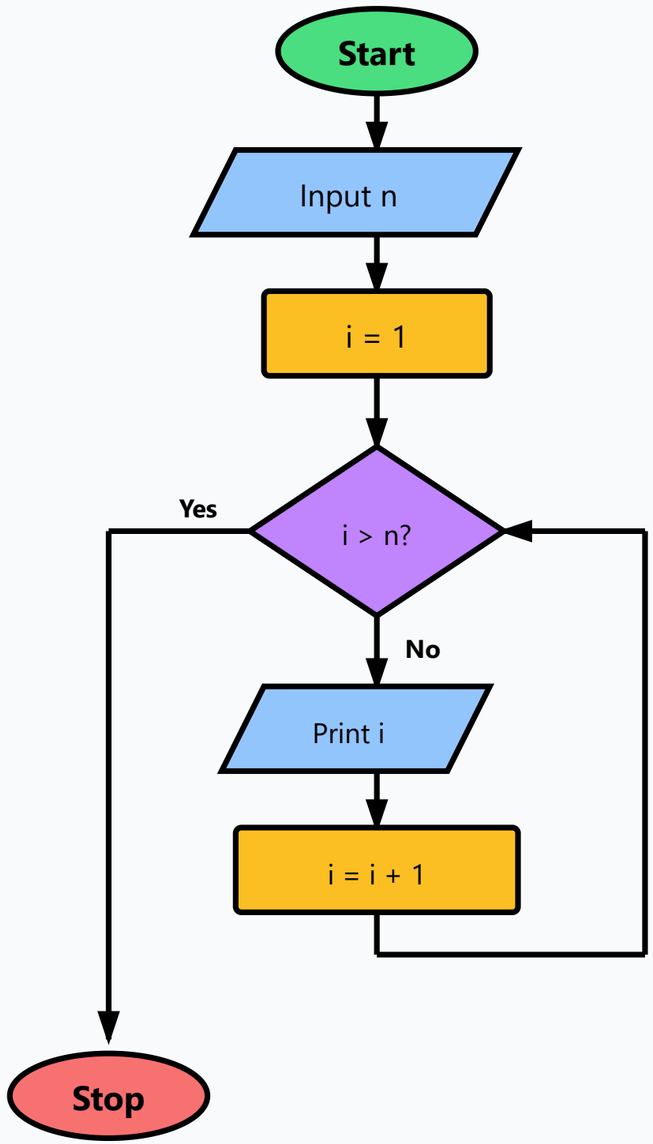
Problem Statement:

Print all integers from 1 to n using a loop.

Algorithm

- **Step 1:** Start
- **Step 2:** Declare variables: i, n
- **Step 3:** Input n
- **Step 4:** Set i = 1
- **Step 5:** If i > n then go to Step 8 else go to Step 6
- **Step 6:** Print i
- **Step 7:** Set i = i + 1 and go to Step 5
- **Step 8:** Stop

Flowchart



Problem 4: Sum of Series 1 + 2 + 3 + ... + n

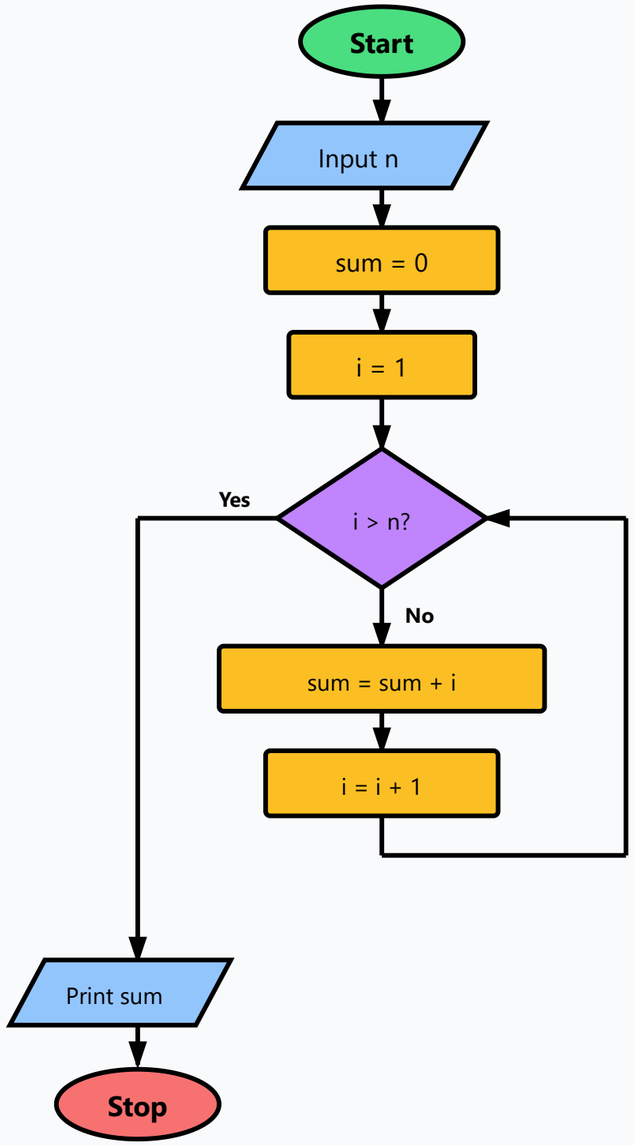
Problem Statement:

Calculate the sum of first n natural numbers.

Algorithm

- **Step 1:** Start
- **Step 2:** Declare variables: i, n, sum
- **Step 3:** Input n
- **Step 4:** Set sum = 0
- **Step 5:** Set i = 1
- **Step 6:** If i > n then go to Step 10 else go to Step 7
- **Step 7:** Set sum = sum + i
- **Step 8:** Set i = i + 1
- **Step 9:** Go to Step 6
- **Step 10:** Print sum
- **Step 11:** Stop

Flowchart



Problem 5: Sum of Series 1 + 4 + 7 + 10 + ... (last term < n)

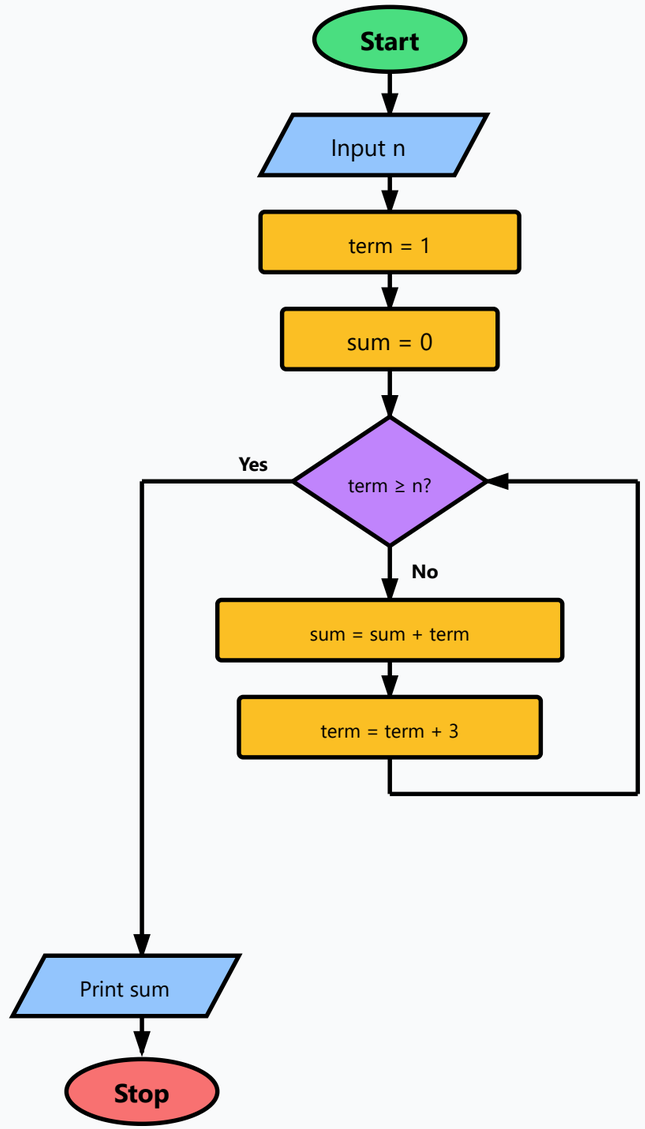
Problem Statement:

Calculate sum of arithmetic series with common difference 3, where last term is less than n.

Algorithm

- **Step 1:** Start
- **Step 2:** Declare variables: term, n, sum
- **Step 3:** Input n
- **Step 4:** Set term = 1
- **Step 5:** Set sum = 0
- **Step 6:** If term ≥ n then go to Step 10 else go to Step 7
- **Step 7:** Set sum = sum + term
- **Step 8:** Set term = term + 3
- **Step 9:** Go to Step 6
- **Step 10:** Print sum
- **Step 11:** Stop

Flowchart



Problem 6: Sum of First n Terms of Series 1 + 4 + 7 + 10 + ...

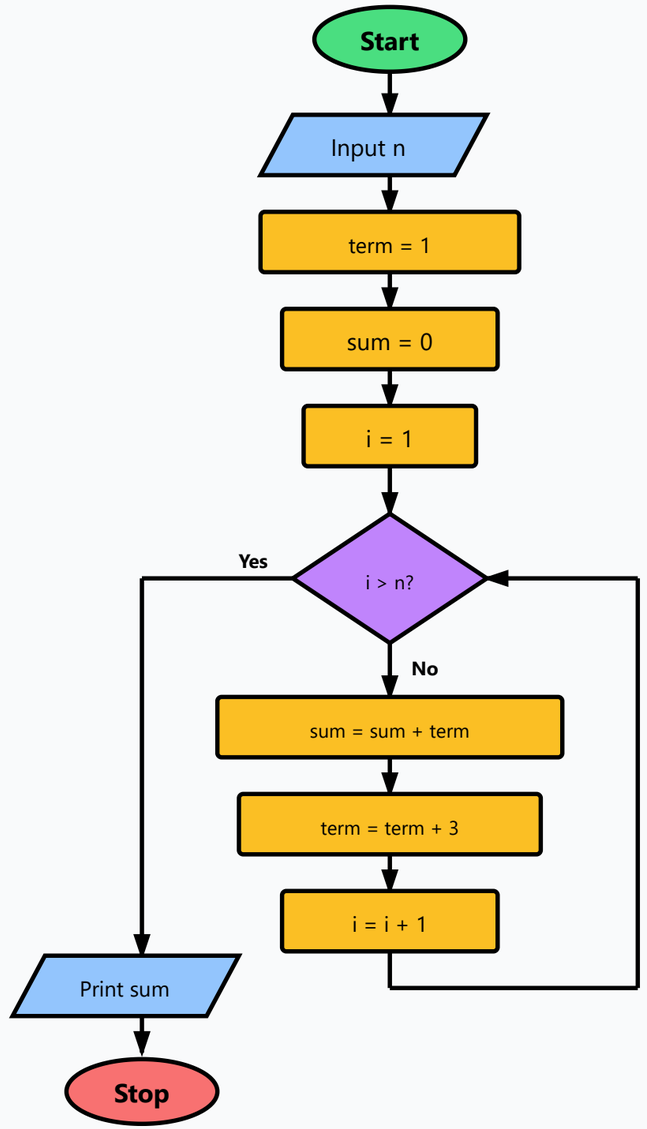
Problem Statement:

Calculate sum of first n terms of arithmetic series with common difference 3.

Algorithm

- **Step 1:** Start
- **Step 2:** Declare variables: i, n, term, sum
- **Step 3:** Input n
- **Step 4:** Set term = 1
- **Step 5:** Set sum = 0
- **Step 6:** Set i = 1
- **Step 7:** If i > n then go to Step 12 else go to Step 8
- **Step 8:** Set sum = sum + term
- **Step 9:** Set term = term + 3
- **Step 10:** Set i = i + 1
- **Step 11:** Go to Step 7
- **Step 12:** Print sum
- **Step 13:** Stop

Flowchart



Problem 7: Factorial of a Number n

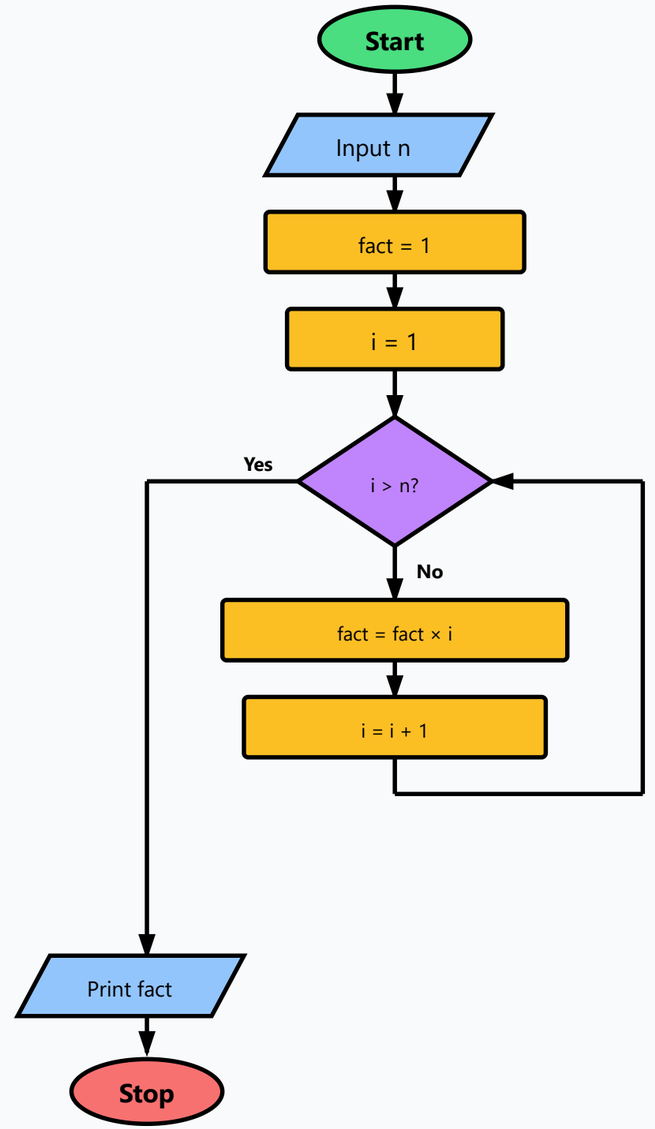
Problem Statement:

Calculate n! = 1 × 2 × 3 × ... × n

Algorithm

- **Step 1:** Start
- **Step 2:** Declare variables: n, i, fact
- **Step 3:** Input n
- **Step 4:** Set fact = 1
- **Step 5:** Set i = 1
- **Step 6:** If i > n then go to Step 11 else go to Step 7
- **Step 7:** Set fact = fact × i
- **Step 8:** Set i = i + 1
- **Step 9:** Go to Step 6
- **Step 10:** (unused)
- **Step 11:** Print fact
- **Step 12:** Stop

Flowchart



Problem 8: Tuition Fee Calculation

Problem Statement:

Calculate total tuition fee based on credits and CGPA with discount.

- Cost per credit = 8250 TK
- Semester fee = 9350 TK
- If CGPA ≥ 3.5, apply 25% discount on total

Algorithm

Step 1: Start

Step 2: Declare variables: credits, CGPA, costPerCredit, tuition, total, discount

Step 3: Set costPerCredit = 8250

Step 4: Set semesterFee = 9350

Step 5: Input credits, CGPA

Step 6: Set tuition = credits × costPerCredit

Step 7: Set total = tuition + semesterFee

Step 8: If CGPA ≥ 3.5 then go to Step 9 else go to Step 10

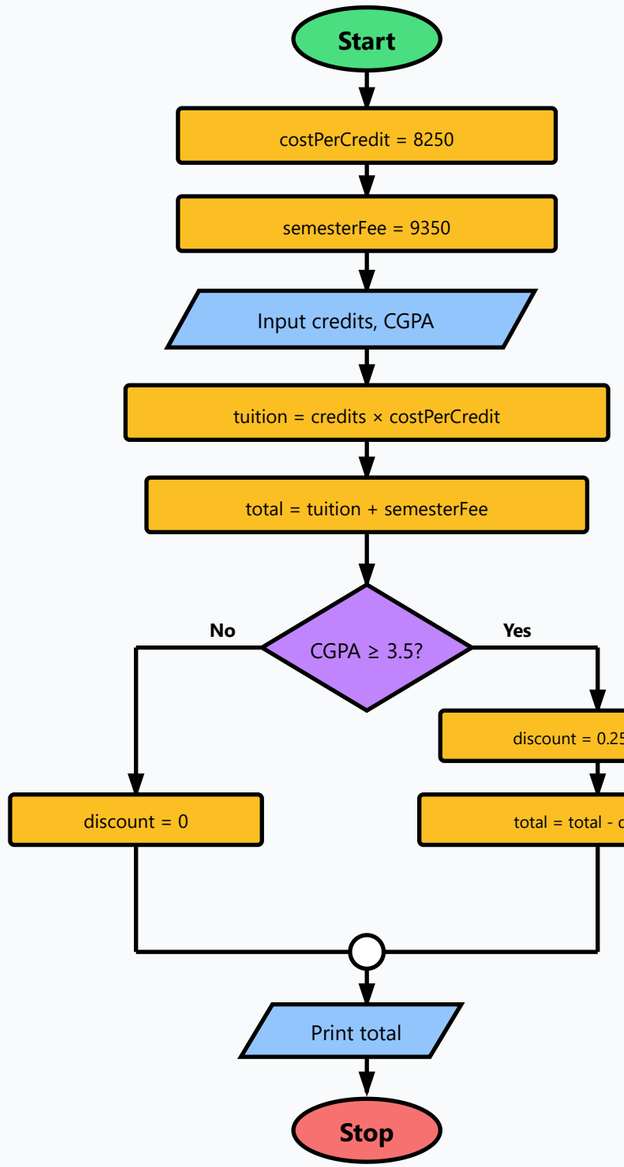
Step 9: Set discount = 0.25 × total; Set total = total - discount; go to Step 11

Step 10: Set discount = 0

Step 11: Print total

Step 12: Stop

Flowchart



Thank You

Keep Practicing!