



**STUDYDADDY**

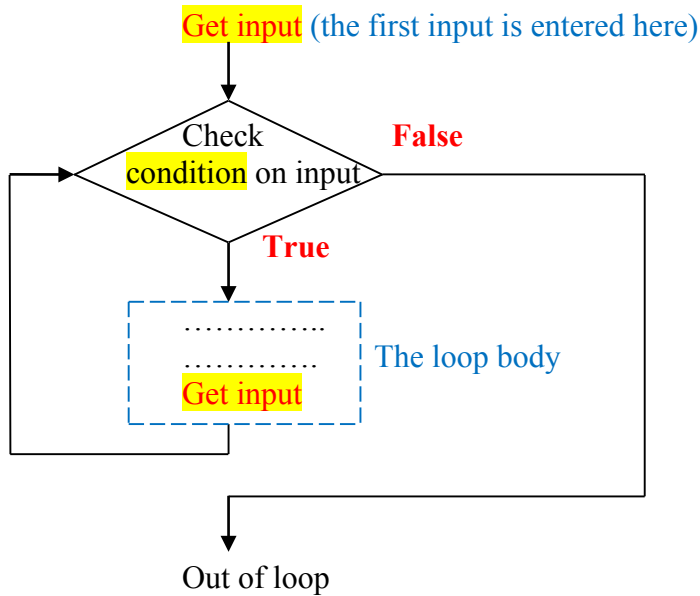
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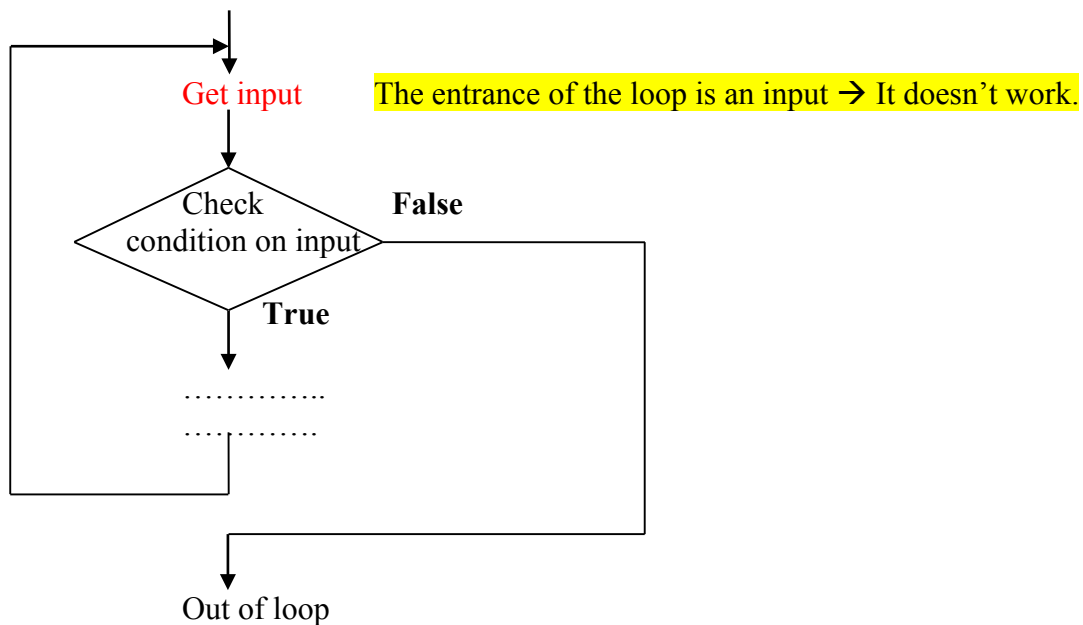
**No late submissions will be accepted.**

**Reminder**

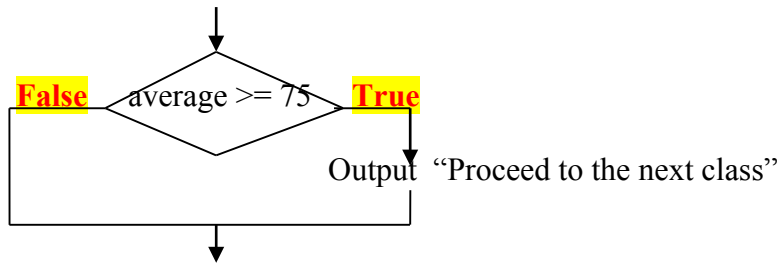
The **while** loop should have the following structure. The entrance of a while loop has to have a condition.



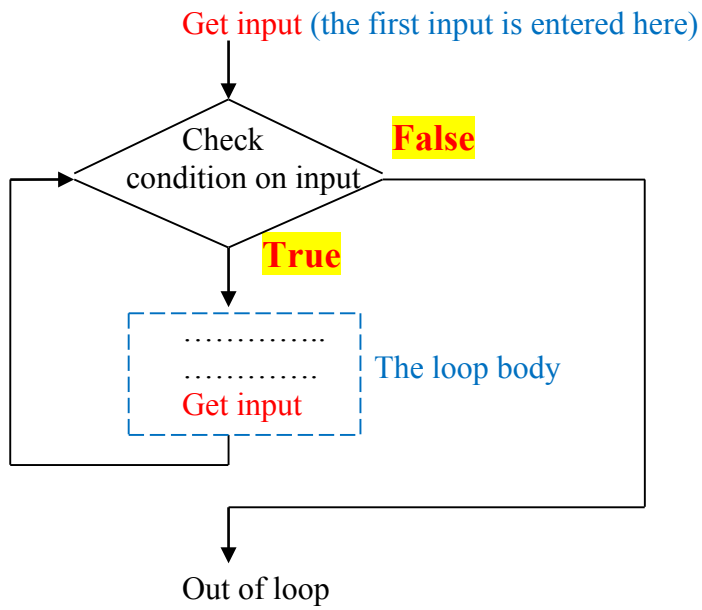
**BAD – The following cannot be converted to C++**

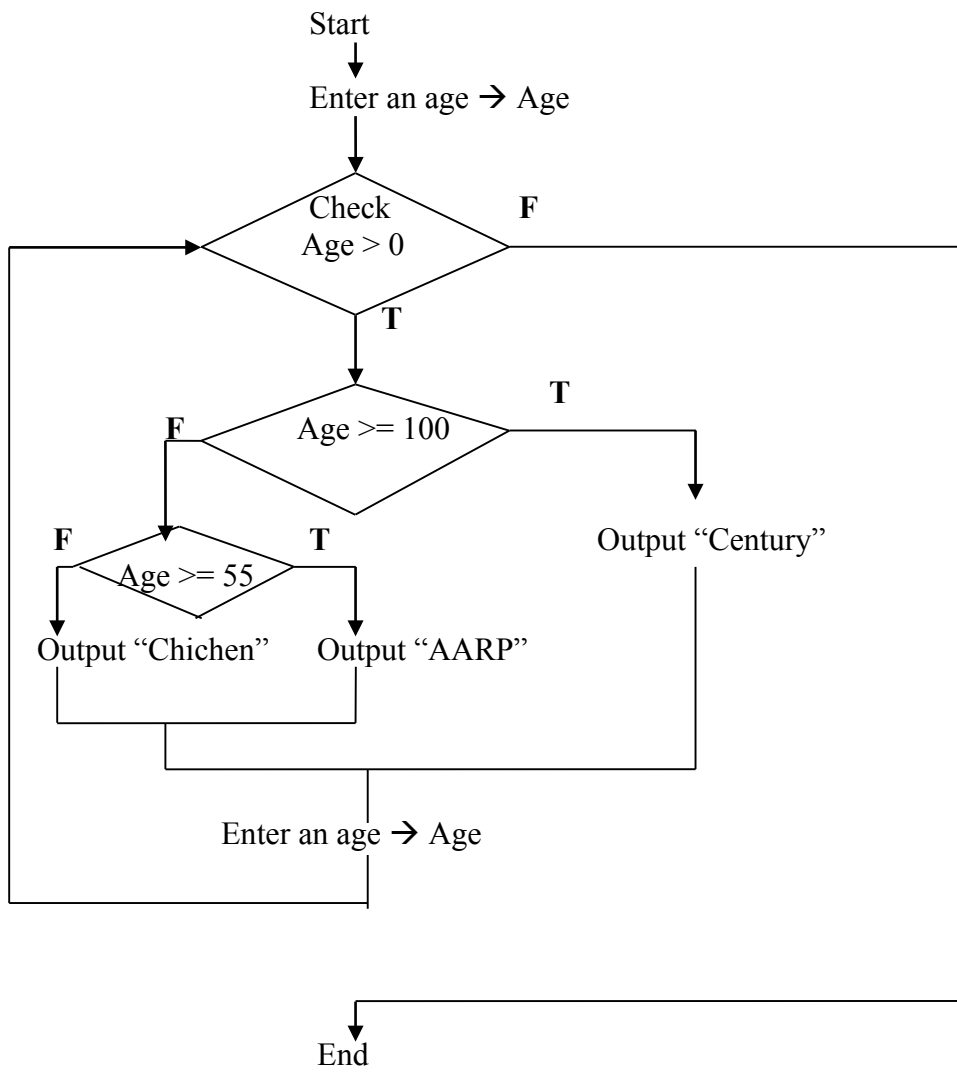


A condition (if/else) has the following structure. True coming out of the right and False coming out of the left.



The while loop has True coming out of the bottom and False coming out of the right.





You are going to draw 3 flowcharts.

You may type or handwrite your flowcharts and tests.

If you have any questions, come see me during my office hours or talk to me before or after lecture or lab.

**HINT: You will not use the do-while loop for this assignment.**

<Problem 1: 20> Draw a flowchart for the program that will calculate BMI from a height (in inches) and a weight (in pounds). The program will tell the BMI along with advice.

BMI is calculated in the following way.

$$\text{BMI} = \frac{\text{weight in pounds} \times 703}{\text{height in inches} \times \text{height in inches}}$$

Give the following advice.

BMI	
25.0 and above	Exercise more
Less than 25.0	You have a healthy weight

Test your algorithm using the following 2 cases.

<Test1>

height: 67

weight: 120

Outputs are

19.79

You have a healthy weight

<Test2>

height: 67

weight: 200

Outputs are

31.32

Exercise more

**<Problem 2: 40 points>** Draw a flowchart for the program that will read an unknown number of ages. (0 is a valid age used for a baby.) The user will enter a negative number if there are no more ages to enter. The program will output the average age and youngest and oldest ages. If no ages were entered, display “No ages were entered” (see <Test 4> below).

**Hint:** Use 2 boxes to store the youngest and oldest ages. What would you put in these boxes at the beginning?

Test your algorithm **using a table** with the following 4 cases. Make one table for each test. **You will have 4 separate tables.**

Age	Age $\geq$ 0	Num	Total + Age $\rightarrow$ Total	Youngest	Oldest	Avg
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**<Test 1>** 20, 0, 10, 5, -1

Outputs should be  
8.75 (average age)  
20 (oldest)  
0 (youngest)

**<Test 2>** 100, 105, -5

Outputs should be  
102.5 (average age)  
105 (oldest)  
100 (youngest)

**<Test 3>** 50, -7

Outputs should be  
50 (average age)  
50 (oldest)  
50 (youngest)

**<Test 4>** -1

Outputs should be  
No ages were entered

**<Problem 3: 40 points>** Draw a flowchart for the program that will let a teacher enter exactly 5 scores (each score needs to be greater than or equal to zero). The program will output the total and average score. Reject bad inputs from the user. If she enters a negative number, tell her “Invalid score. Enter a score again”.

Test your algorithm **using a table** with the following 2 cases. Make one table for each test. **You will have 2 separate tables.**

Repetition#	Score	Score < 0	Total + Score → Total	Avg
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**<Test 1>**

Enter a score: -10  
Invalid score. Enter a score: -50  
Invalid score. Enter a score: -35  
Invalid score. Enter a score: 20  
Enter a score: -30  
Invalid score. Enter a score: 60  
Enter a score: -40  
Invalid score. Enter a score: 40  
Enter a score: 30  
Enter a score: 15

The total score is 165  
The average is 33

**<Test 2>**

Enter a score: 25  
Enter a score: 55  
Enter a score: 0  
Enter a score: 80  
Enter a score: 30

The total score is 190  
The average is 38

**<HINT>**

Use a while loop to reject negative inputs. Refer to page 12 in “Lecture Notes: Algorithms – repetition”.



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