Name: **Blake Allard**

Assignment #3
Programming Basics Part 2: Selection & Repetition

Goal

For this assignment, you will practice your skills in developing algorithms using selection & repetition.

To gain these skills you will be asked to:

1. Develop two looping algorithms
   a. One with a *flowchart*
   b. The other with *pseudocode*
2. Determine the most appropriate loop based on the problem statement
3. Test your algorithms using a proper desk check for your looping algorithms

Instructions

For the following problems, diagram a FOR loop or a WHILE loop depending on which is MOST appropriate. Use **Excel** as a diagramming tool (it is okay to use another computer-based tool as long as you can properly format your flowchart). Use a font that does not print smaller than a standard 12pt font. Do not scale your document. Instead, use the techniques discussed in class and tutorial videos to get it to fit. This flowchart should not be split. Remember, with flowcharts and pseudocode, **you do not need to concern yourself with output that doesn't vary based on the input** (in other words, output not based on a Boolean expression).

REMINDER: All assignments are to be completed individually. You may not get help from anyone other than the class tutors or Dr. Rousseau.

Steps

For each problem**:**
1. Highlight the INPUT in green and the OUTPUT in blue or underline the inputs & circle outputs on the problem statement.
2. Fill out a loop worksheet
3. Write the algorithm (either flowchart or pseudocode) / with a variable list
4. Perform the desk check
5. Include your name on each submitted page

Problem #1: Exam Scores

Instructions

Draw a flowchart for a program that will obtain 10 exam scores from the user and determine whether the score is passing (a score of 60 or above) or failing. Your algorithm should calculate and output the number of passing and failing scores and the average of all of the scores.

Perform a desk check using the following values: *60, 75, 51, 92, 88, 12, 61, 23, 95,* and *78*.
FORMAT desk checks as covered in class including variables and output.

Example Input / Output:

Given the following input for the exam scores: **16**, **82**, **45**, **100**, **60**, **51**, **33**, **75**, **95**, **89**

The program will output:

Passing Scores: 6

Failing Scores: 4

Average Score: 64.6

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Problem #2 : Aunt Joan's Egg Ranch

Write the pseudocode for Aunt Joan's egg ranch problem. Aunt Joan has a large number of chicken coops. Each day she gathers eggs from a different number of chicken coops and wants to track how many dozens and excess eggs she gathers from each individual coop. She will enter a series of numbers representing the number of eggs gathered from each chicken coop. The program will calculate and output the number of dozens as well as the number of excess eggs for that coop before entering the input for the next coop. The program will continue this process until a negative number is entered.

Perform **one desk check** with the following input values: *24, 8, 15, and -999.*

Example:

In this example, Aunt Joan gathered eggs from 2 chicken coops. She gathered 43 eggs from the first coop and 32 from the second coop. She entered -5 (it could be any negative value) to indicate she was done entering the eggs. The program outputs the dozen and excess eggs gathered for each individual coop.

Example Input/Output: (user input is green → user output is blue)

> Enter the number of eggs gathered: 43
> You have 3 dozen and 7 eggs.
>
> Enter the number of eggs gathered: 32
> You have 2 dozen and 8 eggs.
>
> Enter the number of eggs gathered: 24
> You have 2 dozen and 0 eggs.
>
> Enter the number of eggs gathered: 11
> You have 0 dozen and 11 eggs.
>
> Enter the number of eggs gathered: -5

Submitting Your Assignment

Your assignment should be submitted as a Single PDF and 1 single Excel Workbook. I won't look at the Excel workbook unless I find alignment errors on your flowchart that I suspect are caused by Excel. Make sure you submit all of your work right side up and in the order specified.

Organize your files in the following order:

1 – Page 1 & 2 of this assignment sheet with Input highlighted in green & Output highlighted in blue for each problem
2 – Problem #1
    a. Loop Worksheet
    b. Flowchart
    c. Typed desk check
3 – Problem #2
    a. Loop Worksheet
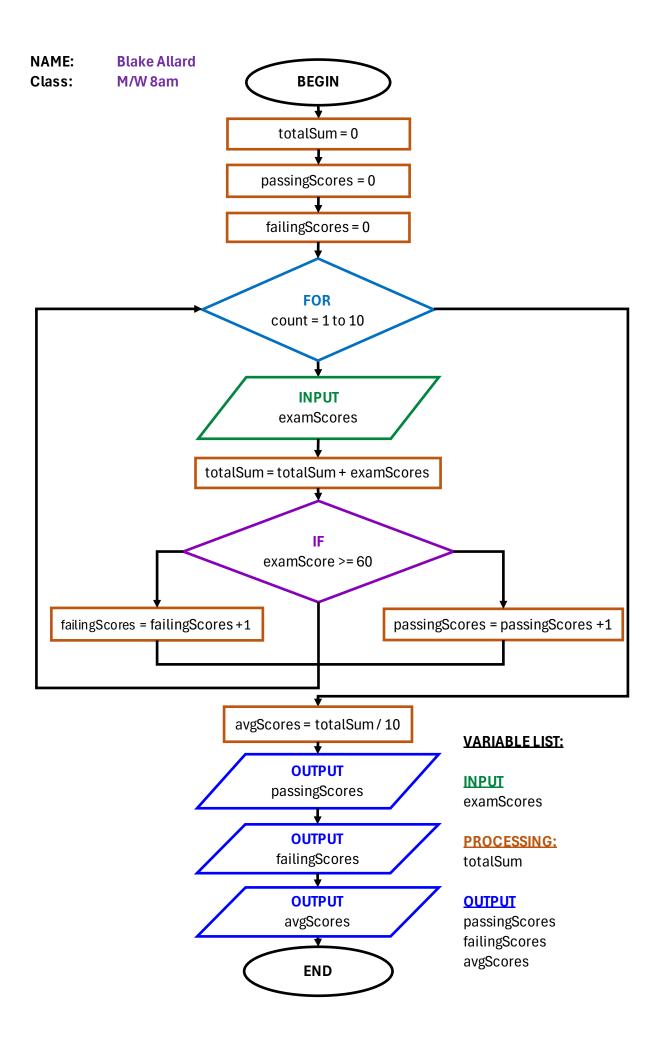   b. Pseudocode
    c. Typed desk check

Be sure to start each problem on a new page, and include your name and class day/time on each page.

LOOP WORKSHEET ⟹ (INPUT / OUTPUT Analysis)

(indicate if the input is the LCV if it isn't does it go in or out of the loop)

INPUT: examScores

            (the input is LCV)

(indicate if the output goes in the loop or out of the loop)

OUTPUT: Out of the loop.

            passingScores

            failingScores

            avgScore

PROCESSING   totalSum   = totalSum + examScores

  IN LOOP: passingScores   = passingScores + 1

            failingScores   = failingScores + 1

  OUT OF LOOP:

            avgScores = totalSum / 10

INITIALIZATIONS:

            totalSum   = 0

            passingScores   = 0

            failingScores   = 0

FOR LOOP:

  How many times will it run? | 10 |

BASIC FORMATS

Loops processing user input

INITIALIZATIONS

FOR count = 1 to *X*

    INPUT

        PROCESSING (IN LOOP)

            OUTPUT (IN LOOP)

END FOR

PROCESSING (OUT OF LOOP)

OUTPUT (OUT OF LOOP)

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BEGIN

totalSum = 0

passingScores = 0

failingScores = 0

FOR
count = 1 to 10

INPUT
examScores

totalSum = totalSum + examScores

IF
examScore >= 60

failingScores = failingScores +1

passingScores = passingScores +1

avgScores = totalSum / 10

OUTPUT
passingScores

OUTPUT
failingScores

OUTPUT
avgScores

END

VARIABLE LIST:

INPUT
examScores

PROCESSING:
totalSum

OUTPUT
passingScores
failingScores
avgScores

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INPUT: 60, 75, 51, 92, 88, 12, 61, 23, 95, 78

EXPECTED OUTPUT: 7, 3, 63.5%

examScore	passingScores	failingScores	totalCount	totalSum	avgScores
60	1	-	10	= 635	63.50%
75	2				
51	-	1			
92	3	-			
88	4				
12	-	2			
61	5	-			
23	-	3			
95	6	-			
78	7	-			

OUTPUT:

     7   (passingScores)

     3   (failingScores)

 63.50%   (avgScores)

LOOP WORKSHEET ⟹ (INPUT / OUTPUT Analysis)

(indicate if the input is the LCV if it isn't does it go in or out of the loop)

INPUT:　　　eggsGathered

　　　　　　　The input is the LCV

(indicate if the output goes in the loop or out of the loop)

OUTPUT:　　In the loop

　　　　　　　dozenCount

　　　　　　　excessEggs

PROCESSING

　　IN LOOP: _____

　　　　　　　CALC dozenCount = eggsGathered / 12

　　　　　　　CALC excessEggs = eggsGathered % 12

　　OUT OF LOOP: _____

INITIALIZATIONS:

　　ASSIGN　eggsGathered　　= 0

　　ASSIGN　dozenCount　　 = 0

　　ASSIGN　excessEggs　　 = 0

WHILE LOOP:

　　　　　　LCV:　　eggsGathered

　　Sentinel Value:　　-1

　　　　Condition:　　<= -1

INITIALIZATIONS

INPUT LCV

WHILE *Condition*

　　　PROCESSING (IN LOOP)

　　　　OUTPUT (IN LOOP)

　　　　INPUT LCV

END WHILE

PROCESSING (OUT OF LOOP)

OUTPUT (OUT OF LOOP)

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BEGIN

    ASSIGN dozenCount   = 0
    ASSIGN excessEggs   = 0

    INPUT   eggsGathered

    WHILE eggsGathered >= 0
        CALC dozenCount = eggsGathered / 12
        CALC excessEggs = eggsGathered % 12

        OUTPUT dozenCount
        OUTPUT excessEggs

        INPUT eggsGathered
    END WHILE

END

VARIABLE LIST:

INPUT
eggsGathered

OUTPUT
dozenCount
excessEggs

CALCULATE

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INPUT: 24, 8, 15, -999.

EXPECTED OUTPUT: 3 dozenCount
                        11 excessEggs

eggsGathered	dozenCount	excessEggs
0	0	0
24	2	0
8	0	8
15	1	3
-999	-	-

OUTPUT: 3   (dozenCount)
               11   (excessEggs)