Problem Set 10: For and While Loops

New Learning Objectives under Evaluation

15.00 Construct and troubleshoot a flowchart using standard symbols and pseudocode

Learning Objective	Evidence
15.03 Construct a flowchart for an indefinite looping structure using standard symbols and pseudocode	A decision indicating an indefinite loop is represented by a diamond filled with a condition A decisions indicating an indefinite loop has one input arrow from processes prior to the loop, one input arrow from processes inside the loop, and two output arrows representing the Yes/No or True/False paths The Yes/True path enters the indefinite loop The No/False path exits the indefinite loop All variables used in the decision or in recursive calculations within the indefinite loop are initialized before the decision All variables used in the decision are updated within the indefinite loop Operations are included in the indefinite loop as required by the problem
15.04 Track a flowchart with an indefinite looping structure	Describe the overall purpose of the indefinite loop in English Describe how the indefinite loop initiates and terminates Determine the correct number of iterations Determine the value(s) of all variable(s) (re)assigned in the loop prior to the start of the loop (iteration 0) Determine the value(s) of all variable(s) (re)assigned in the loop at the end of each iteration Determine the value(s) of all variable(s) (re)assigned in the loop at the end of loop execution
15.05 Construct a flowchart for a definite looping structure using standard symbols and pseudocode	A decisions indicating a definite loop is represented by a diamond broken into three parts indicating the loop index start value, the index value condition to terminate the loop, and the index increment A decision indicating a definite loop has one input arrow from processes prior to the loop, one input arrow from processes inside the loop, and two output arrows representing the Yes/No or True/False paths The Yes/True path enters the definite loop The No/False path exits the definite loop All variables that used in recursive calculations within the definite loop are initialized before the decision Operations are included in the definite loop as required by the problem
15.06 Track a flowchart with a definite looping structure	Describe the overall purpose of the definite loop in English Describe how the definite loop initiates and terminates Determine the correct number of iterations Determine the value(s) of all variable(s) (re)assigned in the loop prior to the start of the loop (iteration 0) Keep track of the value of the definite loop index at each iteration Determine the value(s) of all variable(s) (re)assigned in the loop at the end of each iteration Determine the value(s) of all variable(s) (re)assigned in the loop at the end of loop execution

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17.00 Create and troubleshoot a repetition structure

Learning Objective	Evidence
17.01 Identify when an indefinite versus a definite looping structure should be used	Recognition that an indefinite looping structure is used when a condition must be met to terminate repeating operations Recognition that a definite looping structure is used when the number or iterations of operations is known or can easily be predetermined or established with starting, increment, and ending values
17.02 Convert between these indefinite looping structure representations: English, a flowchart, and code	Recognize that a diamond structure with two input arrows (one from outside and one from inside the loop) and two output arrows (labeled Yes/No or True/False) translates to a while statement Recognize variables that must be initialized before the while loop for the while conditional statements and operations within the loop to execute Variables used in the condition and within the loop are initialized in the same way across representations (e.g., same values) Recognize that the Yes or True path leads to operations within the while loop Operations are completed and ordered in the same way across representations Variables are (re)assigned within the loop in the same way across representations (e.g., same computations) Recognize that the No or False path translates to an end statement
17.03 Code an indefinite looping structure	Begin an indefinite looping structure with a `while` The `while` is followed by a condition for which a true result corresponds to code within the indefinite looping structure Variables in the condition are set correctly prior to the indefinite looping structure Variables assigned in recursive calculations within the indefinite loop are initialized correctly outside of the indefinite looping structure Variables in the condition are updated in the indefinite loop in such a way as to make the condition false Operations within the indefinite looping structure are correct `end` is used to terminate the indefinite looping structure Statements between the `while` and `end` are indented
17.04 Track execution of an indefinite looping structure using a variable tracking table	Describe the overall purpose of the indefinite loop in English Describe how the indefinite loop initiates and terminates Determine the correct number of iterations Determine the value(s) of all variable(s) (re)assigned in the loop prior to the start of the loop (iteration 0) Determine the value(s) of all variable(s) (re)assigned in the loop at the end of each iteration Determine the value(s) of all variable(s) (re)assigned in the loop at the end of loop execution

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17.05 Convert between these definite looping structure representations: English, a flowchart, and code	Recognize that a diamond structure with three entries and two input arrows (one coming from outside and one coming from inside the loop) and two output arrows (labeled Yes/No or True/False) translates to a for statement The three entries in the diamond correspond to the start value: increment : end value in the for statement Variables used within the loop are initialized in the same way across representations Recognize that the Yes or True path leads to operations within the for loop Variables are (re)assigned within the loop in the same way across representations Operations are completed and ordered in the same way across representations Recognize that the No or False path translates to an end statement
17.06 Code a definite looping structure	Begin a definite looping structure with a `for` Correct syntax for a `for` is index = start_value:increment:end_value or index = vector Variables assigned in recursive calculations in the definite loop are initialized correctly outside of the definite looping structure Operations within the definite looping structure are correct `end` is used to terminate the definite looping structure Statements between the `for` and `end` are indented
17.07 Track execution of a definite looping structure using a variable tracking table	Describe the overall purpose of the definite loop in English Describe how the definite loop initiates and terminates Determine the correct number of iterations Determine the value(s) of all variable(s) (re)assigned in the loop prior to the start of the loop (iteration 0) Determine the value(s) of all variable(s) (re)assigned in the loop at the end of each iteration Determine the value(s) of all variable(s) (re)assigned in the loop at the end of loop execution