Problem Set 09: Flowcharts and Selection Structures

New Learning Objectives under Evaluation

15.00 Construct and troubleshoot a flowchart using standard symbols and pseudocode

Learning Objective	Evidence
15.01 Construct a flowchart for a selection structure using standard symbols and pseudocode	Decisions that are part of a selection structure are represented with a diamond filled with a condition Decision have one input arrow and two output arrows (one for Yes/True and one for No/False) There are operations on the Yes/True path For a single selection (i.e., if-end), there are no operations on the No/False path before the convergence of the Yes/True and No/False path arrows For two possible selections (i.e., if-else-end), there are operations on the No/False paths before the convergence of the Yes/True and No/False path arrows For multiple related selections (i.e., if-elseif-else), there are no operations between the decisions along the No/False path For multiple related selections (i.e., if-elseif-else), the Yes/True and No/False path arrows converge after all related decisions and (optionally) the operations for the else path Operations are included in the selection structure as required by the problem
15.02 Track a flowchart with a selection structure	Identify correct path given the test value(s) Describe the outcome(s) in English with resulting values when appropriate (not code results)
15.09 Create test cases to evaluate a flowchart	Create a thorough set of test cases to test all possible paths in a flowchart Use English to completely describe each test and the intended path through the flowchart List the test values in an appropriate format Test values are consistent with the test description
15.10 Construct a flowchart using standard symbols and pseudocode	Recognize and implement standard flowchart symbols • Start and stop for the overall flowchart are represented by ovals • Inputs and outputs are represented by parallelograms • Decisions are represented by diamonds • Processes, such as calculations, are represented by rectangles

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	• Operations are connected with arrows with points at one end to indicate flow Arrows must connect all flowchart elements and indicate a continuous flow from start to stop Arrows must converge prior to stop so that there is only one arrow into the stop Overall flowchart ends in one single stop Text within the symbols is in concise English (not code or only math) that conveys the purpose of the step Flowchart is complete and represents all possible outcomes required by the problem Decisions are accompanied by Yes/No or True/False text on the appropriate arrows

16.00 Create and troubleshoot a selection structure

Learning Objective	Evidence
16.01 Convert between these selection structure representations: English, a flowchart, and code	Recognize that a diamond structure with one input arrow and two output arrows (labeled Yes/No or True/False) translates to an if or elseif statement The number of diamonds in the flowchart translates exactly to the number if and elseif statements Recognize that the first 1-in/2-out diamond in a flowchart (or first following other non-decision instructions or the first on a Yes path following a decision) is an if statement Recognize that all immediately following 1-in/2-out diamonds on the No or False path are elseif statements Recognize an else statement is implied if there are operations between the only or last diamond and the convergence of the flowchart connecting lines. Recognize that a convergence of the entire No or False path with the entire Yes or True path translates to an end statement
16.02 Code a selection structure	Begin a selection structure with an if The if is accompanied by a condition for which a true result corresponds to code that immediately follows elseif is used for a series of related conditions Each elseif is accompanied by a condition which a true result corresponds to code that immediately follows

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	elseif is a single word – there is no space between else and if An else is used to handle any condition(s) not addressed in the earlier parts of the selection structure and not used if no code is needed before the end An else is not accompanied by a condition end is used to terminate the selection structure Statements between the if, elseif, else, and end are indented A selection structure addresses all necessary paths for a given problem
16.03 Track execution of a single selection structure	Identify correct path given the input value(s) Provide the correct output(s) for the path
16.04 Track execution of a nested selection structure	Identify correct paths given the input value(s) Provide the correct output(s) for the paths
16.05 Create test cases to evaluate a selection structure	Create a thorough set of test cases to test all possible paths in the selection structure Use English to completely describe each test and the intended path through the selection structure List the test values in an appropriate format Test values are consistent with the test description