
AP[®] Computer Science Principles

Sample Student Responses and Scoring Commentary Set 2

Inside:

Written Response 1

- ☒ **Scoring Guidelines**
- ☒ **Student Samples**
- ☒ **Scoring Commentary**

Digital Portfolio Components provided separately

Video, Program Requirements, and Written Response 1**3 points****General Scoring Notes**

- Written responses should be evaluated solely on the rationale provided.
- Responses must demonstrate all scoring criteria, including those within bulleted lists, in each reporting category to earn the point for that category.
- Terms and phrases defined in the terminology list are italicized when they first appear.

Reporting Category	Scoring Criteria	Decision Rules
Course Project: Video (0–1 points)	The video demonstrates the running of the program including: <ul style="list-style-type: none"> • <i>input</i> • <i>program functionality</i> • <i>output</i> 	Consider the video (or Program Code if necessary) when scoring this point. <ul style="list-style-type: none"> • The video needs to show at least one aspect of the program’s functionality. • If the source of the input is unclear from the video, consider the full program code file when scoring this point. Do NOT award a point if the following is true: <ul style="list-style-type: none"> • The video does not show a demonstration of the program running (screenshots or storyboards are not acceptable and would not be credited).
Course Project: Program Requirements (0–1 points)	The program code includes: <ul style="list-style-type: none"> • A <i>student-developed procedure</i> • A call to the student-developed procedure • A <i>list</i> (or other <i>collection type</i>) • A use of the list • <i>Selection</i> • <i>Iteration</i> 	Consider the Personalized Project Reference (or Program Code if necessary) when scoring this point. <ul style="list-style-type: none"> • If the program requirements do not appear in the Personalized Project Reference, consider the full program code file when scoring this point. • The procedure does not need to have a <i>parameter</i> to earn this point. • The <i>code segments</i> demonstrating selection and iteration do not need to appear in the same <i>algorithm</i> to earn this point. • The code segments demonstrating selection and iteration do not need to be contained in a procedure to earn this point. Do NOT award a point if any one or more of the following is true: <ul style="list-style-type: none"> • The list is a one-element list. • The use of the list is irrelevant (i.e., not connected to the program’s functionality). • The call to the procedure is inconsistent with the procedure header (unless allowed by the programming language). • The use of either the selection or the iteration is trivial (i.e., does not affect the outcome of the program).

Reporting Category	Scoring Criteria	Decision Rules
Written Response 1: Program Design, Function, and Purpose (0–1 points)	<p>The written response:</p> <ul style="list-style-type: none"> identifies the expected group of users of the program. explains how the program addresses at least one concern or interest of the identified users. 	<p>Consider the Video (or Program Code if necessary) and Written Response 1 when scoring this point.</p> <ul style="list-style-type: none"> If the video is not available or does not provide enough context to evaluate Written Response 1, consider the full program code file when scoring this point. The expected group of users can be a single user. The response must address at least one concern or interest of the identified group of users. <p>Do NOT award a point if the following is true:</p> <ul style="list-style-type: none"> Any of the explanations of how the program addresses the concerns or interests of the identified users is implausible, inaccurate, or inconsistent with the program. The expected group of users is everybody (or similar).

AP Computer Science Principles Create Performance Task Terminology

Algorithm: An algorithm is a finite set of instructions that accomplish a specific task. Every algorithm can be constructed using combinations of sequencing, selection, and iteration.

Arguments: The values of the parameters when a procedure is called.

Code segment: A code segment refers to a collection of program statements that are part of a program. For text-based, the collection of program statements should be continuous and within the same procedure. For block-based, the collection of program statements should be contained in the same starter block or what is referred to as a “Hat” block.

Collection type: Aggregates elements in a single structure. Some examples include: databases, hash tables, dictionaries, sets, or any other type that aggregates elements in a single structure.

Data stored in a list: Input into the list can be through an initialization or through some computation on other variables or list elements.

Input: Program input is data that are sent to a computer for processing by a program. Input can come in a variety of forms, such as tactile (through touch), audible, visual, or text. An event is associated with an action and supplies input data to a program.

Iteration: Iteration is a repetitive portion of an algorithm. Iteration repeats until a given condition is met or for a specified number of times. The use of recursion is a form of iteration.

List: A list is an ordered sequence of elements. The use of lists allows multiple related items to be represented using a single variable. Lists are referred to by different terms, such as arrays or arraylists, depending on the programming language.

List being used: Using a list means the program is creating new data from existing data or accessing multiple elements in the list.

Output: Program output is any data that are sent from a program to a device. Program output can come in a variety of forms, such as tactile, audible, visual, movement, or text.

Parameter: A parameter is an input variable of a procedure. Explicit parameters are defined in the procedure header. Implicit parameters are those that are assigned in anticipation of a call to the procedure. For example, an implicit parameter can be set through interaction with a graphical user interface.

Procedure: A procedure is a named group of programming instructions that may have parameters and return values. Procedures are referred to by different names, such as method, function, or constructor, depending on the programming language. A procedure is executed through the use of a procedure call.

Program functionality: The behavior of a program during execution, often described by how a user interacts with it.

Purpose: The problem being solved or creative interest being pursued through the program.

Selection / conditional statement: A selection / conditional statement affects the sequential flow of control by executing different statements based on a condition being true or false. The use of if-statements and try / exception statements are examples of selection / conditional statements.

Sequencing: The application of each step of an algorithm in the order in which the code statements are given.

Student-developed procedure / algorithm: Program code that is student-developed has been written (individually or collaboratively) by the student who submitted the response. Calls to existing program code or libraries can be included but are not considered student-developed. Event handlers are built-in abstractions in some languages and will therefore not be considered student-developed. In some block-based programming languages, event handlers begin with “when.”

The expected users of my program are people who are bored and are looking for entertainment. My program addresses the users' boredom by providing them with an enjoyable video game in which they can play by using the arrow keys. Additionally, the implementation of points and highscores allow the user to enjoy the game even more by being able to competing against their old scores or their friends score.

The program could be used by a large amount of people. The program is made to kind of just look cool and be fun, and it is also customizable, so it could be used by developers, as a background to a loading screen, or the background of a website. The program can also be used by people who are bored or want something to look at.

It quite intuitive and simple to use for anyone, whether it be someone with almost no experience with technology, or someone who is a seasoned developer. It addresss an intrest, because it is mesmerizing to look at, and can be an easy thing to add to the background of someone, or fun to look at and play with when bored.

The expected group of users to use my program are volleyball referees, coaches and players. My program addresses a concern or interest of the users I identified by the user identifying a name for each team either vinyls or puff. The user then can input the scores of each team. Using the values that the user input, my program determines the winner of each round as well as the overall winner of the volleyball game. It also identifies if a round was a tie and if the whole game was a tie.

My program expected group of users are NFL fans but was created for people just getting into the NFL to share basic information of the teams at the time. The program includes every team and share the information about the teams division which is part of america where they play, divisions include North, East, West, and South. The program tells users where their teams are located and their stadiums. The program shows each teams logo when selected and finally the program shares the names of the team's head coaches at the year of 2019-2020. Then after the user looks at all the information they can answer any questions based on the information provided on and team. This is to help people just getting into the NFL get an idea of the teams they choose to root for.

My problem shows interest to users of the sneaker community. Explain to them the increase of value of sneakers over time and how much the value possible rises. The program shows the retailed price and then a value increase showing how much profits is made from the original to the new price.

My program addresses each interest and concern of the user playing. Firstly, by giving the option of viewing the menu to give the user time to order. Secondly, by having a variety of options to choose from, there is not one set option and the user can choose if they want to skip or order a meal. They can choose to order again to try something new aswell. The code is built upon the idea that each user has a different food taste and can decide on the many options available to them. They can also play the game again to see if they can get a different "Special's" option. If the user has not interest in any of the options given they can choose to skip and move onto the next conditional if thats what they prefer.

Question 1

Note: Student samples are quoted verbatim and may contain spelling and grammatical errors.

Overview

The responses to this question were expected to demonstrate that the student could:

- demonstrate the program input, functionality, and output in a short video (Course Project: Video),
- develop a working program that includes a student-developed procedure including sequencing, selection and iteration, and the creation and use of at least one list or collection (Course Project: Program Requirements), and
- explain at least one valid program input and how the program uses the input to perform its functionality (Written Response 1: Program Design, Function, and Purpose).

Students were asked to record a video demonstrating their program’s functionality including input and output. Input could be user input (e.g. mouse clicks, text-entry) or file or database input. The source of the input can be verified by examining the program code if the video did not clearly capture the input.

The students were then asked to provide, on their Personalized Project Reference sheet, segments of code from their program that demonstrated a student-developed procedure which utilized selection and iteration appropriately, along with segments of code showing the creation of a list (or collection) and use of the same list (or collection) to contribute to the purpose of the program. Designing a program that includes these core features is critical to understanding basic programming in any language.

In Written Response 1, students were asked to identify the expected users of the program and to explain how the program addresses a concern or need of those users.

Question 1 (continued)

Sample: A

Score:

Video: 1

Program Requirements: 1

Question 1: 1

Video:

The response earned this point, demonstrating all three criteria:

- The response demonstrates input by showing the user entering text into a text box that initiates a program function (game sign in/start).
- The response demonstrates program functionality by starting the game after the user inputs the requested information.
- The response demonstrates output by changing the screen and prompting the user in the game play.

Program Requirements:

The response earned this point, demonstrating all six criteria:

- The response includes a student-developed procedure:
`add+highscore+to+browser+from+(scores).`
- The response calls the procedure: `add highscore to browser from (your scores).`
- The response includes selection: `if item[i] of scores > highscore...`
- The response includes iteration: `for i=1 to length of scores...`
- The response includes a list or collection: `scores.`
- The response shows the list or collection being used in the program in part ii of the List section in the PPR.

Question 1:

The response earned this point, demonstrating both criteria:

- The response identifies a specific user or user group: “The expected users of my program are people who are bored and are looking for entertainment.”
- The response explains how the program addresses a concern or interest of the identified user or user group: “My program addresses the users’ boredom by providing them with an enjoyable video game in which they can play by using the arrow keys.”

Question 1 (continued)

Sample: B

Score:

Video: 1

Program Requirements: 1

Question 1: 1

Video:

The response earned this point, demonstrating all three criteria:

- The response demonstrates input by showing the user interacting with a slider: Ball Speed.
- The response demonstrates program functionality by showing the graphics reacting to the input.
- The response demonstrates output by changing the speed of the graphics in response to the changes in the Ball Speed control.

Program Code:

The response earned this point, meeting all six criteria:

- The response includes a student-developed procedure: `function createlines(ballArr).`
- The response calls the procedure: `createLines(starArr).`
- The response includes selection: `if(i != j)...`
- The response includes iteration: `for(var k = 0; k < lineArr.length; k++)...`
- The response includes a list or collection: `starArr.`
- The response shows the list or collection being used in the program in part ii of the list section of the PPR.

Question 1:

The response earned this point, meeting both criteria:

- The response identifies a specific user or user group: “The program can also be used by people who are bored or want something to look at.”
- The response explains how the program addresses a concern or interest of the identified user or user group: “It addresss an intrst, because it is mesmerizing to look at, and can be an easy thing to add to the background of someone, or fun to look at and play with when bored.”

Question 1 (continued)

Sample: C

Score:

Video: 1

Program Requirements: 1

Question 1: 0

Video:

The response earned this point, demonstrating all three criteria:

- The response demonstrates input by using a keyboard to enter numbers in response to prompts.
- The response demonstrates program functionality by prompting for scores of two teams across each of three rounds and then displaying winners and losers.
- The response demonstrates output by displaying the winning and losing teams of each round and of the overall game.

Program Code:

The response earned this point, demonstrating all six criteria:

- The response includes a student-developed procedure: `function askPoints(x, y).`
- The response calls the procedure: `askPoints(x, y).`
- The response includes selection: `if (puffPoints[i] > vinylsPoints[i])...`
- The response includes iteration: `for (var i = 0; i < 3; i++)...`
- The response includes a list or collection: `puffPoints.`
- The response shows the list or collection being used in the program in part ii of the List section in the PPR.

Question 1:

The response did not earn this point, demonstrating one of the two criteria:

- The response describes a specific user or user group: “volleyball referees, coaches and players”.
- The response does not explain how the program addresses a concern or interest of the identified user or user group. It instead describes the program’s functionality.

Question 1 (continued)

Sample: D

Score:

Video: 1

Program Requirements: 0

Question 1: 1

Video:

The response earned this point, demonstrating all three criteria:

- The response demonstrates input by showing the user selecting a team from a dropdown list.
- The response demonstrates program functionality by populating information on the screen in response to the user selection.
- The response demonstrates output by displaying the text in four information boxes on the screen corresponding to the user selection.

Program Requirements:

The response did not earn this point, demonstrating four of the six criteria:

- The response does not include a student-developed procedure. The procedures are all event handlers.
- The response does not call a student-developed procedure since all procedures are event handlers.
- The response includes selection: `if (selection1 == idList[i])...`
- The response includes iteration: `for (var i=0; i < idList.length; i++)...`
- The response includes a list or collection: `idList`.
- The response shows the list or collection being used in the program in part ii of the List section in the PPR.

Question 1:

The response earned this point, demonstrating both criteria:

- The response identifies a specific user or user group: “My program expected group of users are NFL fans.”
- The response explains how the program addresses a user concern or interest: “This is to help people just getting into the NFL get an idea of the teams they choose to root for.”

Question 1 (continued)

Sample: E

Score:

Video: 1

Program Requirements: 0

Question 1: 0

Video:

The response earned this point, demonstrating all three criteria:

- The response demonstrates input by showing the user entering text in response to a prompt which activates a program function.
- The response demonstrates program functionality by performing a calculation in response to the input.
- The response demonstrates output by displaying text showing the results of the calculation.

Program Requirements:

The response did not earn this point, demonstrating five of the six program requirements:

- The response includes a student-developed procedure: `def shoe_price(shoe_names, shoe_prices).`
- The response calls the procedure: `shoe_price(shoe_names, updated_prices).`
- The response does not include selection.
- The response includes iteration: `for price in shoe_prices:...`
- The response includes a list: `updated_prices.`
- The response shows the list being used in the program in part ii of the List section in the PPR.

Question 1:

The response did not earn this point, demonstrating one of the two criteria:

- The response does identify a specific user or user group: “My problem shows interest to users of the sneaker community.”
- The response explains what the program does, not how it addresses concern or interest: “Explain to them the increase of value of sneakers over time and how much the value possible rises. The program shows the retail price and then a value increase showing how much profits is made from the original to the new price.”

Question 1 (continued)

Sample: F

Score:

Video: 1

Program Requirements: 0

Question 1: 0

Video:

The response earned this point, demonstrating all three criteria:

- The response demonstrates input by showing the user enter text into a text box which activates a program function.
- The response demonstrates program functionality by presenting appropriate text in response to the input.
- The response demonstrates output in the form of a text bubble in response to the user input.

Program Requirements:

The response did not earn this point, demonstrating five of the six criteria:

- The response includes a student-developed procedure: `Menu`.
- The response calls the procedure: `Menu`.
- The response includes selection: `if answer = Yes = yes...`
- The response does not include iteration.
- The response includes a list: `Appetizers`.
- The response shows the list being used in the program in part ii of the List section in the PPR.

Question 1:

The response did not earn this point, demonstrating none of the criteria:

- The response does not identify a specific user or user group. The response refers to users but does not identify a specific group or individual.
- The response explains what the program does, not how it addresses a need: “The code is built upon the idea that each user has a different food taste and can decide on the many options available to them.”