Your name: Daniel Weinert

Turn-in date: 7/10/2021

**You’re going to do great** on this exam! The exam should take you 1.5 to 4 hours to complete.

Instructions: RIGHT NOW- save this document as: yourLastName\_exam1\_spring2021a.docx

RIGHT NOW- read the statement below and replace the indicated text with your name. Doing so indicates that you have read, understand, and will abide by the following rule about cheating:  
  
This exam is open book and open note. You **may NOT** consult with any other students or humans. Do NOT “work together”, “check your answers”, or otherwise interact with ANY OTHER students or humans. Unless you are specifically instructed to do so, DO NOT consult the web or the internet. Copying and pasting from the internet is considered cheating. Your answers need to be your own words, and you need to be able to explain them if I ask you about them. **Cheating on this exam will result in a grade of F in the class.**

I Daniel Weinert understand that **if I cheat on this test, or leave the signature line above blank, I will receive a zero on this exam and an F in this class**

RIGHT NOW- skim the entire exam- make sure you note that there is a PROJECT at the end.

The point break-down for the exam is as follows:

Multiple-choice and essay questions: 30 points

Program-level walk-through: 30 points

Flow chart: 30 points

**Instructions**: answer the following questions in the space below. Use complete sentences or bullet points, as appropriate. Unless otherwise stated, assume approximately a 150 word max for each essay question. To submit your exam, save this document as yourLastName\_exam1\_summer2020. Turn in this document, as well as your program-level walk-through, your flow-chart, and your pseudocode (each as a separate document- so 4 documents total- exam, program-level, flow chart, pseudocode). Submit all documents through Canvas.

(note: for questions 1 and 2- you may want to make a table in Excel and then copy and paste it into this document.)

Q1) Find 3 examples of computer hardware INPUTS for sale on the web. For each input:

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Brief Description | Listed Cost | Source |
| **Keyboard** | Allows you to input characters, numbers and general text. | $20.00 | [Amazon](https://www.amazon.com/HP-Z9H48AT-ABA-Business-Keyboard/dp/B06XY2558L) |
| **HOTAS** | Allows you to input button commands and precise axis movements to control flight simulation software and games | $199.99 | [Amazon](https://www.amazon.com/ThrustMaster-2960778-Thrustmaster-T16000M-HOTAS/dp/B01KCHPRXA) |
| **USB Microphone** | Allows you to input live audio like speech. | $34.99 | [Amazon](https://www.amazon.com/Microphone-TONOR-Podcasting-Compatible-TC-777/dp/B07WLWN2ZT) |

Q2) Find 3 examples of computer hardware OUTPUTS for sale on the web.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Brief Description | Listed Cost | Source |
| **Monitor** | Allows you to see the visual aspect of the OS and programs, called the GUI. | $159.00 | [Amazon](https://www.amazon.com/ASUS-VP279HE-Adaptive-Sync-Frameless-Mountable/dp/B08RH8VGG9) |
| **Speakers** | Allows you to hear audio like music | $17.99 | [Amazon](https://www.amazon.com/AmazonBasics-Computer-Speakers-Desktop-USB-Powered/dp/B07D7TV5J3) |
| **Printer** | Allows you to output documents and information on paper | $139.89 | [Amazon](https://www.amazon.com/HP-ENVY-6055e-Wireless-Printer/dp/B08XYRVSRT) |

Q3) What is modularity? Give three examples of modularity in real life. For each example- list 2 specific ways that modularity is beneficial to someone. (zero points if you don’t list the benefits)

-Modularity defines how close or how far apart systems or objects are with each other.

-Government: Having government split up in an interdependent relationship of federal, state and local gives people faster and better access to their governmental needs. It also allows each level to focus on their requirements more closely.

-Car: A car is split up into many parts that work and require each other but are not necessarily depended on specific type of part. This allows someone to replace a broken part in their car with a cheaper off brand version of that part which saves the person money. Also, not every competent is crucial and might be support by others so if a certain competent fails other components can hold it up and the car might still function normally.

-Audio Mixer: Allows you to change a multitude of settings for an audio stream. This allows someone to change the volume of their microphone for example or change the bass level of the music coming into their headphones.

Q4) What are the key characteristics of pseudocode? How is pseudocode different from a flowchart? (hint- refer to chapter 3 of the green book)

-Pseudocode is used to display general system designs. The key characteristics are that it closely resembles code but is structured in a more English way. There is no standardized version of it, and it usually relates to the programming language being used at the end. Since its text based and does not use charts it is a vastly different visual representation style of design than flowcharts.

Q5) What is the (binary) number 01001111 as a base-10 number?

-79

Q6) Why are modern computers based on the base-2 (binary) system instead of the base-10 number system?

-Computers are build on the basic concept of being in 2 states. Either on or off, this allows the computer to process and output information in a relatively simple way that allows massive scaling like we require for modern machines. Binary is the best system to represent that by using o and 1 for off and on. If we used the decimal system to represent the same information, it would complicate the entire thing by a lot because now we must keep track of a lot of information and actions for just a small amount of data. It would take a lot of resource to scale this up to our current bandwidth of information flow.

Q7) What is a register? Name and describe 3 types of registers presented in the green textbook.

-Accumulator: stores the results of the last processed action from main memory

-Instruction: keeps the instructions in the control unit before decoding and passing it on

-Adress: contains the location of the next piece of data

Q8) From chapter 1 of the green book- What is a bus? What does it do?

-A bus is a communication pathway or more precisely the internal wiring in your system. It allows information to flow across components. It has made up of three main parts. First the Control which controls the timing and action of read or write. Second the Address which locates the location of information or memory. And thirdly Data which is the actual data transferring part.

Q9) What is the difference between an interpreted language and a compiled language?

-A interpreted language gets converted to machine code line by line. This means that you can just interpret single lines and pieces of code. One example for this would be python. On the other hand, a compiled language uses the entire source code at once when it gets converted to machine code. This lets you efficiently convert entire programs but will not let you do code one liners. One example for this type of language is C++.

Q10) According to the book- what are the 2 main parts of the CPU? Name and briefly describe them.

-Control Unit: Stores the data and sends out instructions to the ALU.

-ALU: Contains circuits to perform the arithmetic and logical instructions sent by the control unit.

Q11) For each of the following concepts, in approximately 100 words or less- a) explain/describe it **in your own words** b) describe how it is implemented in a flow diagram.

1. Sequence: This represents the flow of events or in terms of code the way in which the code gets executed

-Represented by “flow lines” which are lines with an arrow attached to it in a flow diagram

1. Selection: Selecting a specific outcome from a question or decision, in terms of code it would be represented by an if

-Represented by “decision: which is a diamond in a flow diagram

1. Iteration: A specific set of action that is happening with an end point, in terms of code it would be the last line

-Represented by “programs” which are round bubble that represented the start and end in a flow diagram

Q12) What is software reusability? What are 2 specific advantages of software reusability?

- Software reusability allows you take blocks of code from one program and reuse it in other and new programs so that you do not have to rewrite the same code all the time.

- Saving time: By not having to write similar code especially common concepts you save a lot of time to write more new code.

- Saving money: By not having to have as many developers working on one project because you can reuse similar code you save money.

**For the “bikes shop” problem described below**

1. **Develop a program-level walk-through (this may be a basic OR annotated version)**
2. **Develop a flowchart OR pseudocode implementation model/chart (the choice is yours)**

**Problem Statement**

The manager of a local bike store requires a monthly report of sales activity. The bike store has 3 locations: Lakewood, Golden, and Boulder.

The user will start by entering the location and month for the report. These should be output immediately after they are entered. For each bike sale, a user will input the saleID, the cost of the bike, and the amount the bike was sold for (we’ll call this the “revenue”). After the saleD, cost, and revenue for each bike is entered, the report should display the saleID, the revenue, the cost, the profit generated by the bike, and whether or not the sale of the bike generated a profit (we’ll call this the “profitYN” flag). Profit is equal to the revenue of the bike minus the cost of the bike. If the sale price of the bike is ZERO or less than the cost of the bike, the profit should show a negative number, and the “profitYN” flag should indicate “no”. If the profit is positive, the profitYN flag should indicate “Yes”. After all sales have been processed, the user should enter -1 as the saleID to indicate the end of data entry and the request the final report. The final report should display the total number of bikes sold, the sum of the total revenue from all of the bike sales, the sum of the cost of all bike sales, the sum of the profit from all bike sales, the average profit for each sale, and the total number of bikes sold at a loss (specifically- this is a count of all the bikes with negative profit).

The average profit for each sale is calculated by dividing the total profit by the total number of bikes sold.

The end of input for the report (the kill flag) is indicated by entering -11 for the saleID.

**Instructions:**

In the “exam\_1” folder (where you downloaded this exam, there is a excel file called “midterm\_bikes\_vrsn”. In that file, there are two worksheets. The “human-level” worksheet shows you an example of a human-level walk-through of the “bikes” problem.

Step 1: On the bikes\_program\_level worksheet, create a program-level walk-through for the problem, using the test data I gave you in the human-level walk-through. Your program-level walk-through should be an **Excel document. DO NOT** submit your program-level walk-through as a WORD file, pdf, or anything other than EXCEL. Save your Excel file as:

*yourLastName\_bikes\_spring2021*

Step 2: Use Word, PowerPoint, or Visio to create a flow chart **OR** pseudocode implementation model. If you create a flowchart, submit it as a Word, PowerPoint, or PDF file. ONLY submit as pdf if you use Visio- DO NOT submit pdf if you created your file in World or PowerPoint. If you write pseudocode- submit it as a WORD file (NO PDF).

Step 3:

Submit the following **THREE** documents through Canvas:

This file- the main exam file.

The Excel file that contains your program-level walk-through. (*yourLastName\_bikes\_spring2021*)

The file that contains your flow chart OR your pseudocode.

Great work! You are DONE!!!