**Homework 1: Computing Foundations and Python Setup**

**Part A: Computing Research**

1. **Hardware vs Software Analysis**
   1. Hardware is the physical components within your computer that allow it to operate. You can look, hear, and touch hardware. Software however is the tools and programs you install on the machine that do certain tasks and utilize the hardware of the machine
   2. Examples of hardware/software
      1. Motherboard (hardware) – The foundational component of a computer; Board that comes in multiple different form factors that has all the slots and ports you place the other components into. The motherboard allows all these components to communicate together cohesively
      2. CPU (hardware) – The brain of the computer; Carries out all the tasks and does all the computing for the software on the system.
      3. GPU (hardware) – The GPU is the illustrator for the computer. Does the processing of graphical effects and images. Important for gaming and 3D modeling as well as things like AI or computing heavy programs due to their ability to multiple tasks at once.
      4. Word (software) – Word is a text editor and word processing application offered in the Microsoft suite of tools. Used to create text files and features a convenient graphical interface with countless features for customization and formatting.
      5. PowerPoint (software) – PowerPoint is a presentation creation tool made by Microsoft that is used to put together slides for lectures or meetings. Often used by businesses professionals, teachers, and students. Has a lot of tools for creating graphics and inserting images/charts along with text boxes and bullet points.
      6. Oracle VirtualBox (software) – Oracle VirtualBox is a type 2 hypervisor software that is used to create, configure, and manage virtual machines on a host device. Using VirtualBox you can make virtual machines and allocate resources from the host device to the VMs often running a different operating system than the host system.
   3. In a computer system, Word is used to access a text file which is stored on your SSD or Hard drive. That information is moved through the busses on your motherboard to your RAM, which the CPU then reads the data contained in the text file from.
2. **Programming Language Investigation** 
   1. Different Programming Languages and their uses, strengths, and typical application:
      1. Python – A great beginner programming language that has a very readable and easy to understand syntax. It’s highly compatible and can run on practically any operating system. Commonly used for web development, data analysis, and automation using scripts.
      2. Java – Java can be a bit more challenging for beginners but than comes with better performance. Java code is compiled end executed at runtime, as opposed to Python which is interpreted. Java is frequently used for Android mobile applications, game development, and enterprise software.
      3. C++ - Much more intense language that operates closer to the hardware level. Although high in complexity, it offers incredibly fast performance and can manipulate and allocate the resources on the host machine. This makes it a preferred language for developing OS kernels, system drivers, and graphics/simulation software.
3. **Career Exploration**
   1. Systems Administrator
      1. A sys admin is responsible for ensuring all the equipment within a company is configured properly and has all the proper hardware and software in place. They need to be familiar with IT support as well as networking and security protocols. They often use Powershell, Bash, and Python scripts to automate common tasks like setting up user accounts and installing software and updates on systems.
   2. Network Engineer
      1. Network engineers design and implement the network of computers, servers, IoT devices and any other connected devices. They must have the knowledge to configure network device to ensure efficient communication and availability of resources. They use coding for things like automating the configuring of devices like routers, switches, and firewalls. They also may use it to write scripts for the collection of system logs and SNMP data.
   3. Cybersecurity Specialist
      1. A cybersecurity specialist needs to be well-versed in maintaining network security in environments containing large amounts of sensitive information. They monitor and maintain the security systems put in place, examine network traffic, and respond to security incidents when they occur. They use coding skills to automate collection of logs and SNMP data, algorithms for threat detection and analysis, and scripts for incident response.

**Part B: Python Environment:**

1. **Installation Documentation** 
   1. Went to Python.org/downloads to download and install latest version of Python (3.13.7) A screenshot of a computer

      AI-generated content may be incorrect.
   2. A screenshot of a computer

      AI-generated content may be incorrect.
2. **VSCode Exploration**
   1. Visual Studio is a great tool for anyone doing coding. It can be used with all types of programming languages and offers many different performance and quality of life features to help developers. After initially installing the program you can add on any extensions you may need using the extensions tab on the left side of the screen. You may want to add extensions to support what language you’ll be writing your program in and tools to assist you when making the script. Along that left side bar are other menus like Manage, Test, Run and Debug, Explore, as well as others.

Once you create a new file and are ready to begin writing a program for the first time, you’ll likely need to open the Command Palette to select an interpreter to run the script. Search for your required language and install the interpreter for the appropriate version. You can then open up the VSCode settings tab (found on the bottom of the left sidebar) to do some tweaking and customizing to your liking. There are tons of settings to look at and change how you desire like text font size, accessibility features, Security features, Extension support and so much more.

When working in the script there are many tools and features at your disposal. At the bottom of the screen there are tabs for your output, problems, debug console, terminal, and more. One of the most useful debugging tools that VSCode features is the stop ability. Clicking just to the left of the number of a specified line will insert a stop at this line. When running the script, the interpreter will pause at that point allowing you to go step by step and see what is happening during this process. This makes identifying errors in code much easier.

Along the top banner of the window is some familiar options like File, Edit, View, etc. Edit has some useful shortcuts you likely have used before in text editors like the undo/redo, cut copy and paste, and the find tool. Once a user is done writing their script, saving the file is just like saving a Word document or most other text files. Simply click on the file option at the top of the window and select save or save as to save to any location on your computer. In this menu you can also create a new file or open one you have previously saved to your system.

VSCode is a great tool for anyone working with code and scripts whether you’re just getting started or an experienced developer. There are many different quality of life features that make debugging and navigating code much easier and the compatibility with so many languages makes it useful for almost any project. I think VSCode is a tool anyone writing code should consider using.

1. **First Programs (SUBMITTED IN GITHUB REPOSITRY!)**
   1. Hello World Script
   2. Two Number Addition Calculator
   3. Two Number Subtraction Calculator