1. Explain the benefits and drawbacks of using C++ in a coding project. Think about the user-focused portion of the grocery-tracking program you completed using C++. What control does this give you over the user interface? How does it allow you to use colors or formatting effectively?

* In completing the grocery-tracking program, I found that when staying within the bounds of ASCII and using the traditional “\t” for tab and “\n” for newline it is quite easy to control the user interface to a certain degree. On the reverse side, using ASCII characters above 128, Unicode characters, and colors can be very difficult. I attempted to use Unicode characters on option 3 but never found a successful solution, I then moved on to using ASCII characters like • and n and again found no real solution. Colors are not that bad if you know the color codes, my Colors.h file was generated off a post I found on StackflowOverflow.com.
* A benefit to creating a console application is they are usually fast to develop
* Overall, I found that if you are only wanting a plain looking console application, it is not that difficult to create an application. It is when you want to incorporate other types of visual components, does it get complex and difficult to implement.

1. Explain the benefits and drawbacks of using Python in a coding project. Think about the analysis portions of the grocery-tracking program you completed using Python. How does Python allow you to deal with regular expressions? How is Python able to work through large amounts of data? What makes it efficient for this process?

* Regex is used by matching a string against a set of rules, if matched the code may modify the string or change it in another way.
* Regex is embedded into Python but needs a module like re to make it available to Python. When compiled, regex is executed by an engine written in C. If looking to do complex rules with regex it may be more beneficial to write Python code to do the process because processing complex regex can make compiling Python even slower.
* Python has a very extensive data science library and wrappers which make it easy and effective to solve data science problems. Using a library like Pandas make it easy to manipulate, read and write data. When compared to low-level languages like C++ it is exponentially more beneficial to write code in Python as editing and then testing Python code is so easy.
  + Python has a reduced memory usage by optimizing data types
  + When data is too large to fit in memory it is split into data chunks instead of dealing with it in one big chunk
  + Lazy evaluation is a strategy that delays execution of an expression until it is actually needed but with Python and more specifically Pandas when the read command is executed is scans, infers the data types and splits into partitions. Then it is only executed when it is really needed.

1. Discuss when two or more coding languages can effectively be combined in a project. Think about how C++ and Python's different functions were able to support one another in the overall grocery-tracking program. How do the two function well together? What is another scenario where you may wish to use both? Then, consider what would happen if you added in a third language or switched Python or C++ for something else. In past courses, you have worked with Java as a possible example. What could another language add that would be unique or interesting? Could it help you do something more effectively or efficiently in the grocery-tracking program?

* Outside of executing a function from C++ to run another function in Python, functions in two different languages can be very complex.
* A scenario for using the two languages together might be in the development of a video game. Using a framework when using two different languages may be better than trying to incorporate them yourself manually.
* Adding a third language can be very difficult if the compilers are different type systems. When passing types from language to language you want to make sure they will be interpreted the same or they are mapped correctly.
* Adding a language like Python would give extensibility to data science and making dealing with data easier.
* In our application Grocery-Tracking, I don’t see where adding another language would make it more effective nor more efficient. The only way I could see making our application more effective would be to implement a library that would make the presentation of data more visual or easily implemented.