CS499 Milestone Three

1. **Briefly describe the artifact. What is it? When was it created?**

The artifact I’ve chosen for this enhancement is an open-source simple calculator that I found on GitHub. It was created in 2022 and had very basic functionality such as addition, subtraction, multiplication, and division. It was written in JavaScript and created as a website.

1. **Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in algorithms and data structure? How was the artifact improved?**

The reason for selecting this artifact is because I could transform this simple calculator into something more efficient as well as more advanced. Since it only had very basic functionality, I made sure to add the remaining parts of “PEMDAS” (parentheses and exponents). On top of those two additions, I made sure that they worked with the enhanced expression evaluation algorithm.

1. **Did you meet the course outcomes you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?**

The targeted course outcome for this milestone was “Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution, while managing the trade-offs involved in design choices”. By using new techniques that employ more efficient and secure algorithms in my enhanced artifact, I believe that I’ve achieved this course outcome.

1. **Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?**

The process of enhancing this artifact first involved finding it. Searching for small open-source projects on GitHub showed me a massive number of options, but I chose this calculator because I saw the opportunity to enhance the way it evaluated expressions. One of the major things I learned during the improvements of this artifact was Dijkstra’s Shunting Yard Algorithm and its implementation. The original implementation only accounts for parentheses, addition, multiplication, and subtraction, so I took it upon myself to attempt to add exponents. The way this was accomplished was through a helper function in the algorithm that determines each operator’s precedence during evaluation. Now the calculator can handle all the “PEMDAS” operations in a very efficient way.