# FEA Project Responses

1. I chose to use C++ for the following reasons:
    a. Familiarity: C++ was selected due to my extensive experience and familiarity with the language.
    b. File Handling: C++ offers straightforward file handling capabilities, making reading from and writing to files very easy.
    c. Passing by Reference: Utilizing pass-by-reference is crucial for a project like this to prevent unnecessary data copying, and C++ provides convenient syntax for this purpose.
    d. Data Structure Support: C++ is excellent for creating and managing data structures (using structs and classes). Packaging data in this way seemed useful for this project. Incorporating pointers within these structures effectively establishes connections between them, as demonstrated in the Element struct.
    e. Performance: Being a compiled language, C++ offers high performance, making it suitable for computationally intensive tasks like matrix operations.
2. Some new things I learned about programming because of this assignment include:
    a. Utilizing a non-standard library in C++ (Eigen) to perform matrix operations.
    b. Determining parameter lists for each function (generally, these are preconfigured).
    c. Managing and organizing data in custom data structures.
3. While I feel like I already had a strong grasp of FEA conceptually, this project made clearer to me the penalty method as well as the assembly of the global stiffness matrix.
4. The first part of this project took me about 1.5 hours. The second part took 5-6 hours.
5. I enjoy code development and would have liked to do more for this class. It would be interesting to constantly update this project throughout the semester as we learn more material (such as adding support for distributed loads, truss elements, etc.).