2. Summarize section 2.3, The IBM 704 and Fortran (no more than 3 pages).

IBM 704 and Fortran are considered one of the single greatest advancements in computing. During the 1940’s and 1950’s computing was incredibly slow due to floating points, and much of a computer's processing was spent on these points. As long as interpreting was needed (if there were floating points) the computer would be slow. But many programers evaded this problem by using assembly language and machines to avoid having to use interpretive strategies. IMB 704 fixed this problem by including interpreting into assembly-type hardware language. The first widely accepted high level computing language was Fortran.

It was announced during the design process that Fortran was the efficiency of hand coded programs with the ease of programming in interpretive pseudocode systems. It was also said that it would eliminate coding errors and ease the debugging process. But in actuality the first Fortran compiler did not include much syntax error checking. IBM recognized that computers were slow and unreliable with small memories, the usage of computers was mostly for scientific purposes, there did not exist an easy and effective way to program computers and the cost of computers and programmers was very high. Fortran’s primary goal was to create code speedily.

Fortran 0 was modified from 1995 until its compiler release in 1957. Fortran 1, which was the implemented language, was commonly referred to as the reference manual for programmers. Fortran 1 had formatting for input and output, variables for up to six characters, and user defined subroutines. Fortran 1’s control statements were actually based on 704’s instructions. Variables were based on the scientific way of lettering things, such as I and J representing integers and others representing floating points. The Fortrans team believed their code by the compiler could be no less than half as fast as handwritten machine code. In 1958 their team reached the efficiency goal and half the code written for 704s was being written in Fortran.

The Fortran 2 compiler was distributed in 1958. This fixed the independent compilation of subroutines. Previously, any change in the routine would require the entire program to be recompiled. The only way was to restrict codes to only being effective if they were a maximum of 300 to 400 lines. Fortran 2 fixed the problem with their independent compilations of the routines and made the compatibility of including these much better. This made it so the compilation process was able to support much larger codes.

Fortran 3 was never popularized but Fortran 4 became the most used compiler of its time in the 1960s. Fortran 4 added type declarations, the if construct and the ability to pass subprogram directions to other subprograms. Fortran 77 came after and was similar to the previous one but added the else clause to if statements and new loop constructs. Then Fortran 90 came and was much different. This version added arrays, records, points, multiple selection statements and modules. This was also significant because subprograms could be called recursively now. However this version of Fortran removed things as well. It dealt with the rigid syntax requirements and removed some rules which made it easier for the programmer to create code. One example of this is that only the first letter of keywords could be uppercase. Fortran 95 came with little changes, one was that programmers could now create parallel programs using a technique called Forall. Fortran 2003 added the ability to use object-oriented programming. This Fortran also was available to compile C and added parameterized derived types and procedure points. The last version of Fotrans (2008) added definitions for local scopes, co-arrays, and DO loops.

The Fortran creators never intended for it to be used on computers not built by IBM. Eventually they were forced to consider its use on other computers.

In my opinion and the opinion of the authors of this textbook, all current code owes a debt to Fortran. It is crazy to see that so many concepts used today were used in something people my age might consider ancient. The evolution of programming all started here, from syntax to loops to if statements to points to variables. All of these integral things we learn in coding classes today originate from Fortran.