Chapter 3

Fundamental (1-6)

1. An assembler is responsible for translating assembly language into appropriate device specific machine code.
2. The HC12/S12 assembler generates two files during assembly. One is the .s19 Motorola Machine Language Program file, the other is the .lst List Program file. The .s19 file is filled with the zeros and ones necessary for the controller to operate. The .lst file contains all of the addresses for each instruction, data definitions, clock cycles for instructions, and a symbol table.
3. The three programming constructs are SEQUENCE, IF-THEN-ELSE, and DO-WHILE.
4. Drawing a flow-chart allows a programmer to sequentially and visually understand the flow of a program. A programmer can use a flow chart to help chart out requirements that a program has to meet.
5. The authors insist on initializing the stack pointer as the last available RAM memory location + 1 because the stack grows from high addresses to low addresses. Initializing the stack pointer in this way minimizes chances of stack memory conflicting with other data stored in lower memory addresses.
6. The stack is designed to preserve variables that can’t be stored or kept in the accumulators. If a subroutine is going to destroy data, then the values should be pushed to the stack before the subroutine and then pulled from the stack after the subroutine to restore the original values.

Advanced (1-2)

1. High Level Programs are more readable by the average person. They are also easier to code because a lot of the specific hardware management (such as memory management) has been abstracted from the programmer. Assembly Language Programs have more hardware considerations that a programmer must be aware of (such as memory management, clock cycles, etc.). The human readability is also much lower than high level programs because of all the hardware considerations mixed in with the logic of a program. Machine Language Programs are unpractical for human reading as they are just made up of the zeros and ones that the computer hardware needs to actually execute the program. Machine Language Programs are the lowest language level a program can take to be executed by a specific computer.
2. The main criteria that should be considered when deciding between pass-by-value or call-by-reference is whether the original data should be changed or not. If the original data should be changed, call-by-reference should be used. If it should be preserved then call-by-value should be used. Another criteria that should be considered is the number of operations that need to be executed on the values. Many load and store directives will slow a program down, so if the values can simply be changed directly it is a better solution.

Challenging (6-7)

1. $C20A