CS 7311

Assignment 1: Modules 1 & 2 (25 points total)

NAME: Charles Bryan

The following questions are based on the activity downloaded from Canvas, described in **7311.Assignment1.Activity.pdf.**

Follow the instructions and answer the following questions.

Part A. (2 pts each)

1. What is the size of this program in bytes? _512_____

2. True or False: The program code, stack and memory all share the computer's RAM? __True_____

3. How many memory accesses (data or instructions moving across the bus) occur during the execution of the demo program? ____10_____

Part B. Enter the following C code into the code window, compile to assembler at ctoassembly.com and answer the following questions (2 pts each)

```
int z = 99;
int main() {
      int x = 1;
      z = x + z;
      return 0;
}
```

Compile and execute and answer the following questions.

4. At what memory address is the global variable **z** stored? __664_____

5. When executing the ADD instruction, that adds 1 to the value of the global variable z, at what memory address is the value 1 located? __-4(%BP)_____

6. When the ADD instruction adds 1 to the value of the global variable z, what memory address is the result of the ADD stored. ____664_____

7. What assembly language statement actually updates the value of z? ___MOV %0, z_____

8. When the program terminates, the last statement is **return 0;**
At what memory location is this value of 0 stored so it can be retrieved by operating system running the code? _____%13_____

Part C.

9. (4 pts) Assume you have 1000 bytes of cache memory such that the entire program will fit into cache memory. Will this have an effect on the running time of the program? Answer yes or no and explain why.

Yes, this will have an effect on the running time of the program. Given that Cache memory is faster to access than main memory because it is located closer to the processor. If the entire program can fit into cache memory, the performance of the program will be improved by minimizing cache misses and reducing memory latency.

10. (5 pts) With respect to cache memory, explain the difference between the principle of **temporal locality** vs. the principle of **spatial locality**.

Temporal locality means that if you've used something recently, you're likely to use it again soon, while spatial locality suggests that if you access one thing in memory, you'll probably need nearby things too. Both help speed things up by reducing the need to go to the slower main memory.