**Midterm**

**CS311 – Spring 2021**

This is a **closed** book exam. **Show all working steps.** Partial credit is given for all questions, with half points being allocated for detailed working.

**Honor Code Statement:** I pledge that this written exam is solely my work, and that I have neither given, nor received help from anyone.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 1:**  20 Marks

*(10pt for working, 10pt for answer)*

Given the following number in base-10, calculate its equivalent base-16 (IEEE 754 format) number.

-99.1875

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 2:**  20 Marks

*(10pt for working, 10pt for answer)*

Given the following listing file, fill in the missing details. In column 3, for labels a, c and d, the values must be in decimal (base 10) format.

***Column 1 Column 2 Column 3***

1 00000000 24 a \_\_ \_\_\_\_\_\_\_\_\_\_

2 00000001 \_\_\_\_\_\_\_\_\_\_\_\_\_\_ b dd -44.375

3 00000005 A4000000<rept> c times \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

4 00000041 3B00AB00E103 d dw \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

5 00000047 FE21010000100010 e \_\_ 0x\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 3:**  20 Marks

Given the following data segment, write code in main which adds all the numbers in **a**. If the final sum is **positive**, it should be saved in **EBX register**, and if it is **negative**, then it should be saved in **R8x register** where x is the 32-bit equivalent size suffix which you need to assign!.

segment .data

a dw -126, 47, 84

segment .text

global main

main:

**Question 4:**  40 Marks

Given the following specifications:

1. Two different data inputs are given, and
2. The following equation has to be coded:

Where is the size of and .

1. The result has to be saved in a memory location through **dereferencing**.

**Write a code in assembly, which meets these requirements**. You will need to **dereference** and then store/update the values.

**Part A:**

You are required to do the following:

1. Allocate the variables and with the **minimum** data type allowed to store their values and as a quad size memory. (5 pts)
2. Code the given equation and save the result in, using only **2 registers**. (20 pts)

**Part B:**

Answer the following questions using the GDB debugger:

What GDB command is needed to **examine** the contents of in **Hex (base 16)** (5 pts)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What GDB command is needed to **print** the value of in base 10 after evaluating the equation and saving the result and what is that final result in **Base 10**  (10 pts)

GDB command: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Final result in base 10:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Compete the following code section:

**segment .data**

A

B

R dq 0

**segment .text**

**global main**

main: