**CSE 3302: Programming Languages**

**Homework 03**

**Name:**

**1000 number:**

**Date:**

**INSTRUCTIONS**

1. **Do NOT plagiarize.**
2. **No group-work. All work should be your own.**
3. **Do not discuss your work with other students in the class.**
4. **Cite sources where necessary.**
5. **Turn in your word document using Canvas. Do not email your documents.**
6. **Name your document as netid.docx where *netid* is your UTA NetID. If you do not know your NetID, check what it is using NetID Self Service. Your 1000 number is NOT your NetID.**
7. **Try to answer each question within a few lines.**

Watch the following videos and answer the questions below

5. [How Computers Calculate - the ALU (Links to an external site.)](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3D1I5ZMmrOfnA&data=02%7C01%7Cxinliang.zhu%40mavs.uta.edu%7Cef1bb5dfbf4c46c5896508d6182ebbce%7C5cdc5b43d7be4caa8173729e3b0a62d9%7C0%7C0%7C636722986331691738&sdata=ohNbPjs7FxPumb7DhzNnPO4cnXZ9GHGATHM8G2xBEr4%3D&reserved=0)

6. [Registers and RAM (Links to an external site.)](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DfpnE6UAfbtU&data=02%7C01%7Cxinliang.zhu%40mavs.uta.edu%7Cef1bb5dfbf4c46c5896508d6182ebbce%7C5cdc5b43d7be4caa8173729e3b0a62d9%7C0%7C0%7C636722986331691738&sdata=%2BSSOPE3gSO1YtGEziMdBIlB4Adrj17QfyTXruugS%2FlE%3D&reserved=0)

7. [The Central Processing Unit (CPU) (Links to an external site.)](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DFZGugFqdr60&data=02%7C01%7Cxinliang.zhu%40mavs.uta.edu%7Cef1bb5dfbf4c46c5896508d6182ebbce%7C5cdc5b43d7be4caa8173729e3b0a62d9%7C0%7C0%7C636722986331701743&sdata=RRg9Lo66eq3g9KjQX4DowCaVtuCfe54AoIBW%2BPTO8Os%3D&reserved=0)

8. [Instructions & Programs](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DzltgXvg6r3k&data=02%7C01%7Cxinliang.zhu%40mavs.uta.edu%7Cef1bb5dfbf4c46c5896508d6182ebbce%7C5cdc5b43d7be4caa8173729e3b0a62d9%7C0%7C0%7C636722986331711757&sdata=LTiR%2B9yKLVi75w7s1jCKlHS4GQtrkuO%2FCUtsOVjDVw4%3D&reserved=0)

**Questions:**

**1.** Design a “Half Adder” circuit for two inputs A and B. Now, design a “Full Adder” circuit using previously designed half adders. **[15 points]**

**2.** What is an overflow? When does it occur? **[6 points]**

**3.** What is Random Access Memory? Why is this called so? **[6 points]**

**4.** What is “And-Or Latch”? Why is this called “latch”? **[5 points]**

**5.** What is a “register”? **[3 points]**

**6.** What is “multiplexer”? **[3 points]**

**7.** Explain fetch phase, decode phase, and execute phase in short. **[12 points]**

**8.** What is clock speed? What is overclocking and underclocking? **[6 points]**

**9.** Why is security important for Programming Language Design? **[8 points]**

**10.** What would be some of the design goals if you were to design a Programming Language? Explain your answer. **[15 points]**

**11.** What is “writability” of a programming language? **[3 points]**

**12.** What are the differences between primitive type and reference type in Java? **[5 points]**

**13.** What is “extra semicolon problem” in C++? **[3 points]**

**14.** What is “macro”? Write a piece of code using a macro. **[7 points]**

**15.** What is “dynamic typing” mechanism? **[3 points]**

**Extra credit (bonus question):**

**1.** Give an example of the following (do not use the examples from the slides or the book) : **[15 points]**

a. Inheiritance

b. Polymorphism

c. Abstract Data Type