**CSE 3302: Programming Languages**

**Fall 2018**

**Homework 02**

**Due on September 05, 2018 [ before 11:59 pm]**

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**Date: 09/03/2018**

**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 Blackboard. 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 5-7 lines.**

**Questions:**

**1.** Describe the Difference engine. **[7 points]**

**Early computing machine proposed by Charles Babbage in 1823 that could approximate polynomials. Babbage was never able to complete the Difference engine due to it requiring 25,000 components collectively weighing 15 tons. A Difference engine was completed in 1991 and it worked as Babbage intended it to.**

**2.** From the following list, which can be considered as a “general purpose computer”? **[3 points]**

a. Step Reckoner

b. Difference Engine

c. Analytical Engine **🡨 ANSWER**

**3.** What were the limitations of Harvard Mark 1? How does current technology deal with those problem? **[7 points]**

**It used electro-mechanical relays in which a control wire attracted a metal arm that completed the circuit when current flowed through the control wire. These relays resulted in slow computations and all the moving parts within the relays caused major wear and tear. Current technology uses transistors where current flows through a control wire in to a gate electrode that can allow or stop the flow of current due to the semi-conductor material it is made of.**

**4.** Why is Silicon Valley so called? **[3 points]**

**A large amount of the development of transistors occurred between San Francisco and San Jose, California. The main material used in the creation of transistors is Silicon, thus the creation of the area known as Silicon Valley.**

**5.** Make boolean logic tables for AND, OR, and XOR (A XOR B). **[9 points]**

**AND OR XOR**

**A AND A = TRUE A OR A = TRUE A XOR A = FALSE  
A AND B = FALSE A OR B = TRUE A XOR B = TRUE  
B AND A = FALSE B OR A = TRUE B XOR A = TRUE  
B AND B = FALSE B OR B = FALSE B XOR B = FALSE**

**6.** Can we implement XOR gate using only NOT, AND, and OR gates? If yes, how? **[6 points]**

**Yes, two inputs go in to an AND gate, which then goes to a NOT gate and a OR gate, then both of those gates go to a final AND gate.**

**7.** How many bits would you need to represent 2018 in binary? How many bytes is that? **[5 points]**

**11 bits. 2 bytes.**

**8.** Write CSE using ASCII code. Write CSE using Unicode. **[5 points]**

**67 83 69. 0043 0053 0045.**

**9.** What were the shortcomings of Assembly languages? **[7 points]**

**When FORTRAN was created, an assembly language program would be approximately 20 times longer than an identical FORTRAN program. Too many lines!**

**10.** What were the advantages and limitations of ALGOL? **[8 points]**

**ALGOL introduced many modern ideas of programming like blocks, loops, selection, data types, arrays and procedures, but was hard to learn and hard to write. It didn’t see much use due to nobody wanting to switch from the already popular FORTRAN.**

**11.** What is the difference between parameters and arguments of a procedure? Explain with appropriate examples. **[7 points]**

**Arguments are values that are passed in to a function. Parameters accept and store the values that were passed as arguments.**

**int main()**

**{**

**int x = 5;**

**print\_num(x); // x is the argument**

**}**

**void print\_num(int num) // int num is the parameter**

**{ printf(“%d\n”, num); } // Wrote in one line to try to stay on current page**

**12.** Write a recursive factorial function/method in C++ or Java (No limitation on number of lines. **[7 points]**

**int factorial(int x)**

**{  
 if(x==1)  
 return 1;**

**else  
 return x \* factorial(x – 1);**

**}**

**13.** Explain Language Syntax and Language Semantics in your own words. **[10 points]**

**Syntax closely relates to the grammar of programming. Syntax is how the language is structured and written. Semantics is the meaning of each individual thing that you write.**

**14.** Explain how Java codes are compiled and then interpreted. **[10 points]**

**Java code is first compiled in to bytecode. What most languages would do next is compile that bytecode in to machine code. What Java does instead is the bytecode is interpreted by the Java Virtual Machine (JVM), then the interpreted bytecode is compiled in to native machine code.**

**15.** Explain the following terms: **[6 points]**

a. Syntactic sugar: **Syntax within a programming language that is designed to make things easier to read or express.** (https://dev.to/chrisvasqm/its-just-syntactic-sugar-apo)

b. API: **Set of subroutine definitions, communication protocols, and tools for building software.** (https://techterms.com/definition/api)

**Extra credit (bonus question):**

**16.** Do you think that C programming language is a successful programming language even though it’s not the most popular language today? Explain your reasonings. **[10 points]**

**Yes, I believe that C is a successful language because it is still being used today and many languages were derived from C. In class we have discussed multiple times that even though Latin is not spoken much if at all today, it is still considered a successful language because many other languages were derived from it. Using that logic, C would have to be considered a successful language because not only was it an inspiration to many other programming languages, it is still seeing good usage today. I think it would be silly to consider any language that it is not the most popular language a failure.**