

CS Bridge Practice Exam 1

May 7, 2019

Note that the questions in this practice exam are not reflective of the true difficulty on the upcoming exam. Some questions will be harder than the ones you will see on the exam while other questions will be easier. Take this practice exam under exam conditions after you feel that you have a good grasp of all the material that will be tested.

1. Suppose that $A = \{1, 2, 3, \{1, 2, 3\}, \{2, 3\}\}$, determine if the following is true or false:

(a) $\{2, 3\} \in A$

(b) $\{2, 3\} \subset A$

(c) $\{\{1, 2, 3\}\} \in A$

(d) $\{\{1, 2, 3\}\} \subset A$

2. Convert the following to

(a) Decimal to Two's Complement

$$-43_{10} = (11010101)_{\text{Two's Complement}}$$

(b) Binary to Hexadecimal

$$110011100_2 = (19C)_{16}$$

3. Find a function whose domain is the set of all integers and whose target is the set of all positive integers that satisfies each set of properties.

(a) Neither one-to-one, nor onto.

(b) One-to-one, but not onto.

(c) Onto, but not one-to-one.

(d) One-to-one and onto.

4. Proofs

- (a) Proof by Contradiction: Suppose that $a, b \in \mathbb{R}$. If a is rational and ab is irrational, then b is irrational.

- (b) Proof by Contrapositive: For any $k \in \mathbb{Z}$, if $3k + 1$ is even, then k is odd.

- (c) Direct Proof: If $x, y \in \mathbb{Z}$ and are both odd, then $x + y$ is even.

5. Find the sum of each individual digit within an integer. You should prompt the user for an integer n . You can assume that the user will not input negative integers or doubles.

For example:

Given $n = 567$, the code should output: 18

Given $n = 18$, the code should output: 9

6. Print out a diamond. Prompt the user for a number n which will serve as the maximum possible number of stars in a row.