**Computer Science 2**   **Lab # 01**



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**CS2 Section # 01**

**Due:** Problem A by the **end of the lab** and Problems B by the end of **Saturday** of the same week.

**TOPIC:**

**Project B:**

**Problem Description:**

1) Problem B is at MyProgrammingLab # 71019(chapter 8, Programming Projects)

**Analysis:**

(Describe the problem including input and output in your own words. Type your answer in the following with **BLUE font color**)

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| **…**  **INPUT: The user will input an integer, between the numbers 0 and 511, to represent the state of coins. The integer will then be converted into a binary string and subsequently into a binary number (through parseInt).**  **OUTPUT: The user’s integer will be converted to a binary number. The binary number is then put through a nested for loop and checked at each digit (through charAt) and determined whether it is a ‘0’ (the output will be an ‘H’) or another number (‘1’, the output will be a ‘T’), and this is done until the binary number is through the nested for loop and the outputs are put in a 3x3 matrix of ‘H’ or ‘T’.** |

**Design:**

(Describe the major steps for solving the problem. Type your answer in the following with **BLUE font color**)

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| **A major step for solving this problem was to figure out how to convert the user’s integer to a binary number so its numbers (zero or one), can then be converted to a ‘H’ or ‘T’ and printed in a 3x3 matrix representing the state of coins based on the integer given. Another major step to solve this problem was to format the binary number so that it would not exceed the number of elements of the matrix (9 elements). A nested for loop was used to go through each element of the matrix and place an output either a ‘H’ or ‘T’ based on whether the specific element of the binary number is a ‘0’ or ‘1’.** |

**Coding:** (Copy and Paste Source Code here. Type your answer in the following with **BLUE font color**)

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| **import java.util.Scanner;**  **public class HeadsAndTails{**  **public static void main(String[] args) {**  **Scanner input= new Scanner(System.in);**  **char[][] matrix= new char[3][3];**  **System.out.print("Enter an integer representing the state of the coins:");**  **int n= input.nextInt();**  **String binary= Integer.toBinaryString(n);**  **binary= String.format("%09d",Integer.parseInt(binary));**  **n=0;**  **for(int a=0; a<3;a++) {**  **for(int b=0; b<3;b++) {**  **char x= binary.charAt(n);**  **if(x=='0') {**  **matrix[a][b]='H';**  **}**  **else {**  **matrix[a][b]='T';**  **}**  **n++;**  **if(b==2) {**  **System.out.print(matrix[a][b]);**  **}**  **else {**  **System.out.print(matrix[a][b]+" ");**  **}**  **}**  **System.out.println("");**  **}**  **}**  **}** |

**Testing:** (Describe how you test this program. Type your answer in the following with **BLUE font color**)

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| **RUN three times, using the same input as in the sample runs:**  **Test 1:**  **Enter an integer representing the state of the coins:114**  **H H T**  **T T H**  **H T H**  **Test 2:**  **Enter an integer representing the state of the coins:404**  **T T H**  **H T H**  **T H H**  **Test 3:**  **Enter an integer representing the state of the coins:48**  **H H H**  **T T H**  **H H H** |