

**Information and Computer Science Department**

**Spring Semester 152**

**ICS 102 – Introduction to Computing I**

**Final Exam**

**Wednesday, May 18, 2016**

**Duration: 120 minutes**

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| **Question #** | **Max Score** | **Score** |
| **1** | 12 |  |
| **2** | 48 |  |
| **3** | 10 |  |
| **4** | 18 |  |
| **5** | 12 |  |
| **Total** | **100** |  |

**Question # 1**

What is the output of the following programs?

| **Programs** | **Output** |
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| **public class FinalQ1A {** **public static void main(String[] args) {** **int a = 18;**  **change(a);** **System.out.println(a);** **}** **public static void change(int a) {** **a = 2;** **}****}** |  |
| **public class FinalQ1B {** **public static void main(String[] args) {** **String exam = "Midterm";** **change(exam);** **System.out.println(exam);** **}** **public static void change(String exam) {** **exam = "Final";** **}****}** |  |
| **public class FinalQ1C {** **public static void main(String[] args) {** **System.out.println(calc(152));** **}** **public static int calc(int n) {** **int d = 0;** **while (n > 0) {** **d++;** **n /= 10;** **}** **return d;** **}****}** |  |
| **public class FinalQ1D {** **public static void main(String[] args) {** **int[] array = {10,20,30,40};** **for (int i = 1; i < array.length; i++)** **array[i] += array[i-1];** **for (int i = 0; i < array.length; i++)** **System.out.println(array[i]);** **}****}** |  |
| **public class FinalQ1E {** **public static void main(String[] args) {** **int[][] mat = {{10,20,30}, {40,50,60}, {70,80,90}};** **for (int i = 1; i < mat.length; i++)**  **System.out.println(mat[i][i]);** **}****}** |  |

**Question # 2**

Consider the following code which shows the first few lines of a class called Square.

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| **public class Square {** **private int side;** |

Write a constructor for the class Square with one parameter to initialize the side of a square.

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Write a copy constructor for the class Square.

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Write a set (mutator) method **setSide**.

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Write a get (accessor) method **getSide**.

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Write an instance method **getArea** to calculate the area of a square.

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Write a static method **getArea** that takes a square as a parameter to calculate the area of a square.

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Write the **toString** method that returns a string representing a square. For a square with side 10, the method returns "square(10)".

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Write the **equals** method that compares two squares and returns true if they have the same side.

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Complete the SquareTest class to produce the shown output.

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| **Code** | **Output** |
| **public class SquareTest {** **public static void main(String[] args) {** **// create a square s1 with side as 10** **// create a square s2 with the copy constructor** **// update the side of s2 to 20** **// print s1 using the toString method** **// print s2 using the toString method** **// compare s1 and s2 using equals method** **// print the area of s1 using the instance method** **// print the area of s2 using the static method** **}****}** | **square(10)****square(20)****s1 equals s2? False****area of s1 = 100****area of s2 = 400** |

**Question # 3**

The following code has some errors. Underline each one and briefly describe it under error column.

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| **Code** | **Error** |
| **import java.util.Scanner;****public class ArrayOfScores2 {** **/\*\*** **Reads in 5 scores and shows how much each score differs from the highest score.** **/** **public static void main(String[] args) {** **Scanner keyboard = new Scanner(System.out);** **double[] score = double[5];** **int index;** **boolean max;** **System.out.println("Enter " + score.length + " scores:");** **score[0] = keyboard.next( );** **max = score;** **for (index = 1; index <= score.length; index++) {** **score[index] = keyboard.next( );** **if (score[index] > max)** **max == score[index];** **}** **System.out.println("The highest score is " + max);** **System.out.println("the scores are");** **for (index = 0; index < length; index++)** **System.out.println(score[index] +**  **" differs from max by " + (max - score[index]));** **}****}** |  |

**Question # 4**

Write a method **swapEnds** that takes an array of integers, swaps the first and last elements in the array.

swapEnds([1, 2, 3, 4]) → [4, 2, 3, 1]

swapEnds([1, 2, 3]) → [3, 2, 1]

swapEnds([8, 6, 7, 9, 5]) → [5, 6, 7, 9, 8]

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Complete the main method that calls **swapEnds**.

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| **public class FinalQ4 {** **public static void main(String[] args) {** **// create an integer array x containing the elements** [1, 2, 3, 4] **// call the method swapEnds** **// print the array x** **}****}** |

**Question # 5**

Write a method **rowsAverage** that will return an array **average** containing the average of each row in the input 2D integer array **grades**.

**Note:** The input array could be a ragged 2D array.

For example:

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| **grades** | **🡺** | **2** | **3** | **4** | **5** |  |  |
|  |  | **10** | **20** | **30** |  |  |  |
|  |  | **12** | **13** | **14** | **12** | **13** | **14** |

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| **average** | **🡺** | **3.5** | **20.0** | **13.0** |

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