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2024 Boo-vitational

October 2024

**General Directions (Please read carefully!)**

1. DO NOT OPEN THE EXAM UNTIL TOLD TO DO SO.

2. There are 40 questions on this contest exam. You will have 45 minutes to complete this contest.

3. All answers must be legibly written on the answer sheet provided. Indicate your answers in the

appropriate blanks provided on the answer sheet. Clean erasures are necessary for accurate grading.

4. You may write on the test packet or any additional scratch paper provided by the contest director, but

NOT on the answer sheet, which is reserved for answers only.

5. All questions have ONE and only ONE correct answer. There is a 2-point penalty for all incorrect answers.

6. Tests may not be turned in until 45 minutes have elapsed. If you finish the test before the end of the

allotted time, remain at your seat and retain your test until told to do otherwise. You may use this time

to check your answers.

7. If you are in the process of actually writing an answer when the signal to stop is given, you may finish

writing that answer.

8. All provided code segments are intended to be syntactically correct, unless otherwise stated. You may

also assume that any undefined variables are defined as used.

9. A reference to many commonly used Java classes is provided with the test, and you may use this

reference sheet during the contest. AFTER THE CONTEST BEGINS, you may detach the reference sheet from the test booklet if you wish.

10. Assume that any necessary import statements for standard Java SE packages and classes (e.g., java.util, System, etc.) are included in any programs or code segments that refer to methods from these classes and packages.

11. NO CALCULATORS of any kind may be used during this contest.

**Scoring**

1. Correct answers will receive **6 points.**
2. Incorrect answers will lose **2 points.**
3. Unanswered questions will neither receive nor lose any points.
4. In the event of a tie, the student with the highest percentage of attempted questions correct shall win the tie.

**2024-2025 Boo-vitational – Computer Science Written**

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| Note: Correct responses are based on Java SE Development Kit 12 (JDK 12) from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (e.g., "error" is an answer choice) and any necessary Java SE 12 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used. **For all output statements, assume that the System class has been statically imported using:**  **import static java.lang.\*;** |

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| **Question 1**  What is ? | |
| **Question 2**  What is output by the code to the right?   1. -1.3333333333 2. 83 3. -1 4. 0 | out.print(84 / 7 % 3 – 4 / 3); |
| **Question 3**  What is output by the code to the right?   1. Say \"Boo!\" 2. Say Boo! 3. Say "Boo!" 4. There is no output due to an error. | out.print("Say \"Boo!\""); |
| **Question 4**  What is output by the code to the right?   1. The Skeleton Won War! 2. The Skeleton Wn War! 3. For The Skeleton War! 4. The Skeleton WWar! | String s1 = "For The Skeleton War!";  String sub1 = s1.substring(4,16);  String sub2 = s1.substring(s1.length() - 7);  out.print(sub1 + " W" + sub2); |
| **Question 5**  What is output by the code to the right?   1. true 2. false | out.print(false&&true^true||false); |
| **Question 6**  What is output by the code to the right?   1. 12.0 2. 15.0 3. 14.0 4. 16.0 | out.print(Math.pow(3,2) + Math.ceil(6.1)); |
| **Question 7**  What is output by the code to the right?   1. -33.0 2. 34.0 3. -32.0 4. There is no output due to an error. | double w = 4 / 5;  int h = 'A';  int s = 0;  out.print(w - ++h + h / (s+=2)); |
| **Question 8**  What is output by the code to the right?   1. 10 2. 6 3. 0 4. 5 | int x = 0, j = 10, k = 5;  if(j % k != 0){  if(j / k > j – k){  x = 10;  }  else x = 6;  }  out.print(x); |
| **Question 9**  What is output by the code to the right?   1. 4444433333222221111100000 2. 43210 3. 444443333222110 4. 433222111100000 | int i = 5;  while(i >0){  i--;  out.print((""+i).repeat(5-i));  } |
| **Question 10**  What is output by the code to the right?   1. [-4.2, 4.8, 5.1, 2.3, 7.4] 2. [1.2, 4.8, 5.1, 2.3, 7.4] 3. [1.2, 4.8, -4.2, 2.3, 7.4] 4. There is no output due to an error. | double[] mike = {1.2, 4.8, 5.1, 2.3, 7.4};  double myers = mike[(int)mike[mike.length-2]];  mike[mike.length–(int)myers] = -4.2;  out.print(Arrays.toString(mike)); |
| **Question 11**  What is output by the code to the right?   1. the monster mash a graveyard smash 2. monster mash a graveyard smash 3. monstermashgraveyardsmash 4. the monster mashagraveyardsmash | String s="they did the monster mash";  String t="it was a graveyard smash";  Scanner sc = new Scanner(s+"\n"+t);  sc.next(); sc.next();  String s1 = sc.nextLine();  String[] words = sc.nextLine().split(" ");  out.print(s1+words[2]+words[3]+  words[4]); |
| **Question 12**  What is output by the code to the right?   1. H 2. 72 3. B 4. 66 | char c = 'Z';  c%=8.2;  out.print(c+64); |
| **Question 13**  What is output by the code to the right?   1. 7 2. 63 3. 112 4. 0 | int z = 4 \* 8 | (16 + 4) << 2;  out.println(z); |
| **Question 14**  Which of the following data types could NOT replace <type> in the code to the right without error?   1. short 2. byte 3. float 4. long | <type> x = 2048;  out.println(x); |
| **Question 15**  What is output by the code to the right?   1. 3 in the hood 2. true In Space 3. In Space 4. true in the hood | ArrayList<String> lep = new ArrayList<String>();  lep.add("1"); lep.add("2");  lep.add("3"); lep.add("In Space");  lep.add("in the Hood");  lep.add("Back 2 tha Hood");  lep.add("Origins");  lep.add("Returns"); out.print(lep.remove("3") + " " + lep.get(3)); |
| **Question 16**  What is output by the code to the right?   1. 1 2. -1 3. 5 4. -5 | out.print("Halloween".compareTo("Christmas")); |
| **Question 17**  Which of the following is NOT valid in a separate class, assuming c is an object of type Car?   1. int nW = c.numWheels; 2. double g = c.getMPG(); 3. Object o = c; 4. double mpg = c.travel( 400, 10); | class Car{  private String license;  private double gallons, odo;  public final int numWheels = 4;  public Car(){  this("VOID", 0, 20);  }  public Car(String l, double m, double g){  license = l;  odo = m;  this.gallons = g;  }  public String toString(){  return license;  }  public double getMPG(){  return odo / gallons;  }  public double getMiles(){  return odo;  }  public void travel(int miles, int tankUsed){  odo += miles;  gallons += tankUsed;  }  } |
| **Question 18**  What is output by the client code below?  Car d = new Car();  d.travel(2000, 40);  out.print(d.getMiles());   1. 50.0 2. 2000.0 3. 0.0 4. There is no output due to an error. |
| **Question 19**  What is output by the client code below?  Car e = new Car("GH0ST", 84, 4);  e.travel(206, 16);  out.print(e +" " + e.getMPG());   1. e 14.5 2. 14.5 14.5 3. e e.getMPG() 4. GH0ST 14.5 |
| **Question 20**  Which of the following expressions is equivalent to the boolean expression above?   1. A 2. B 3. Always true | |
| **Question 21**  What is the possible range of values that could be output by the code to the right?   1. 2 (exclusive) to 13 (exclusive) 2. 0 (inclusive) to 13 (inclusive) 3. 2 (exclusive) to 13 (inclusive) 4. 2 (inclusive) to 13 (exclusive) | Random r = new Random();  double d = r.nextDouble(2,6);  int i = r.nextInt(7);  out.println(d+i); |
| **Question 22**  What is output by the client code shown here?  A b = new B();  out.println(b instanceof B);   1. true 2. false | public class A{  private int val;  public A(int v){  val = v;  }  public int getVal(){  return val;  }  }  public class B extends A{  public B(){  **// CODE 1**  }  } |
| **Question 23**  What line in the client code shown here contains an error?  B b = new B(); **// LINE #1**  b.val+=3; **// LINE #2**  out.println(b.getVal()); **// LINE #3**  out.println(b); **// LINE #4**   1. **// LINE #1** 2. **// LINE #2** 3. **// LINE #3** 4. **// LINE #4** |
| **Question 24**  What should replace **// CODE 1** so that the val instance variable of all B objects is initialized to 12?   1. this.val = 12; 2. getVal() = 12; 3. super(12); 4. this(12); |
| **Question 25**  Which of the following 8-bit binary numbers is the two's complement representation of -113?   1. 10001111 2. 01110001 3. 11110001 4. 11111111 | |
| **Question 26**  What should replace **<CONDITION>** so that the selectionSort function correctly implements selection sort?   1. a[i] > a[min] 2. a[i] < a[min] 3. a[j] > a[min] 4. a[j] < a[min] | static void selectionSort(int[] a){  for(int i=0; i<a.length; i++){  int min = i;  for(int j=i+1;j<a.length;j++){  if(**<CONDITION>**){  min = j;  }  }  if(j != min){  int t = a[i];  a[i] = a[min];  a[min] = temp;  }  }  } |
| **Question 27**  What is output by the client code shown here?  int[][] m = {{3,4,5},{1},{6,7,9,0}, {2,4,6,8},{-3,-5,-1}};  out.println(Arrays.toString(fun(m)));   1. [4.0, 1.0, 5.5, 5.0, -3.0] 2. [3.0, 0.25, 5.5, 5.0, -2.25] 3. [0.0, 0.0, 0.0, 0.0, 0.0] 4. There is no output due to an error. | public static double[] fun(int[][] mat){  double res[] = new double[mat.length];  for(int i=0; i<mat.length; i++){  for(int j=0; j<mat[i].length; j++){  res[i] += mat[i][j];  }  res[i]/=mat[i].length;  }  return res;  } |
| **Question 28**  What is output by the code to the right?   1. Bman, Woman 2. atlf 3. atman, lfman 4. There is no output due to an error. | Pattern p = Pattern.compile(  "[^A-Z]{1,2}(?=man)");  String n = "Batman, Wolfman";  for(String s: p.split(n)){  out.print(s);  } |
| **Question 29**  What is output by the code to the right?   1. Math.PI 4 eva 2. 3.14 4 eva 3. 3.14 eva 4 4. There is no output due to an error. | out.printf("%,.2f %3$s %2$3d", Math.PI, 4, "eva"); |
| **Question 30**  public class Monster implements Comparable<Monster>{  //implementation not shown }  Which of the following method headers is required in the Monster class?   1. public int hashCode() 2. public boolean equals(Object o) 3. public int compareTo(Monster m) 4. public String toString() | |
| **Question 31**  What is output by the code to the right?   1. 12 2. -2 3. 7 4. 0 | Stack st = new Stack<Integer>();  st.push(7);  st.push(6);  st.push(-2);  st.push(st.push(12));  st.pop();  out.print(st.peek()); |
| **Question 32**  What is the height of the binary tree (number of connections between the root and the farthest leaf) created by inserting the values to the right in the order given?   1. 4 2. 3 3. 1 4. 10 | 5 12 -2 7 0 -4 10 6 8 3 |
| **Question 33**  What is output by the code to the right?   1. s 2. fright 3. ghoul 4. scary | int a = 7;  int b = 14;  String s = b>a?b/a>2?"fright":"scary":"ghoul";  out.print(s); |
| **Question 34**  Which of the following does not cause or contain an error?   1. X u = (X) new Y(); 2. W w = new Y(); 3. Z z = new X(); 4. Y[] xa = {new X(), new W()}; | class X{}  class Y extends X{}  class Z extends X{}  class W extends Y{} |
| **Question 35**  What is the output of the code to the right?   1. 789.0 2. 18.0 3. The output is a blank line. 4. There is no output due to an error. | Scanner sc = new Scanner(  "12.4\n789 18");  sc.nextDouble();  sc.nextLine();  sc.next();  out.println(sc.nextDouble()); |
| **Question 36**  How much (additional) memory space will a quicksort algorithm use for large sets of data?   1. O(n) B) O(1) C) O(log(n)) D) O(n2) | |
| **Question 37**  What is returned by the function call scare("trick")?   1. kckickricktrick 2. trickrickickckk 3. trick 4. tricktricktricktricktrick | public static String scare(String A){  if(A.length()<=1){  return A;  }  return A+scare(A.substring(1));  } |
| **Question 38**  What is output by the client code shown here?  MathFunction m = (a,b) -> a \* b + b / a;  out.print(m.operate(2, 0x16));   1. 33 2. 55 3. 40 4. 0 | interface MathFunction{  int operate(int a, int b);  } |
| **Question 39**  What is the value of the prefix notation expression below?  \* + 7 3 / 16 2 | |
| **Question 40**  What is the value of the expression below in base 10?  64 >> 3 | ~21 & 12 | |

**BOO-VITATIONAL 2024**

**COMPUTER SCIENCE WRITTEN TEST- KEY**

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| 1. C 2. C 3. C 4. A 5. B 6. D 7. A 8. C 9. D 10. A        1. D 2. B 3. C 4. B 5. D 6. C 7. D 8. B 9. D 10. A | 1. D 2. A 3. B 4. C 5. A 6. D 7. A 8. A 9. C 10. C        1. A 2. A 3. D 4. A 5. B 6. C 7. B 8. B 9. 80 10. 8 |

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**BOO-VITATIONAL 2024**

**COMPUTER SCIENCE WRITTEN TEST**

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| 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_        1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_ | 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_        1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_ |

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| # Correct \_\_\_\_\_ x 6 = \_\_\_\_\_  # Incorrect \_\_\_\_\_ x -2 = \_\_\_\_\_  Total Score = \_\_\_\_\_ |  | Grader 1 \_\_\_\_\_\_\_ Initials \_\_\_\_\_\_  Grader 2 \_\_\_\_\_\_\_ Initials \_\_\_\_\_\_  Grader 3 \_\_\_\_\_\_\_ Initials \_\_\_\_\_\_ |