**COMPUTER SCIENCE Written TEST**

**Lamar University ACM**

**February 29, 2020**

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

1. DO NOT OPEN THE EXAM UNTIL YOU ARE INSTRUCTED TO DO SO.
2. There are 40 questions on this contest exam. You will have 45 minutes to complete this test.
3. All answers must be legibly written on the answer sheet. The answer sheet is reserved for answers only.
4. You may write on the test packet or any additional scratch paper provided by the contest director.
5. All questions have ONE and only ONE correct answer.
6. Tests and answer sheets must be turned in once 45 minutes have elapsed. If you finish the test before the end of the allotted time, remain at your seat and retain you test until told to do otherwise. You may use this time to check your work.
7. If you are in the process of writing an answer on the answer sheet when the signal to stop is given, you may finish writing your answer on the answer sheet.
8. A reference to many commonly used Java classes is provided with this test.
9. NO CALCULATORS of any kind may be used during this contest.
10. Correct responses are based on Java, J2sdk v 1.9.x, from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (i.e. error is an answer choice) and any necessary Java 2 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used.

**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.

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| Question 1 xx  What is 34414 plus 11203?   1. M8E33 B. 146410 C. 6909 D. M831 E. 57A11 | |
| Question 2 xx  What is output by the code to the right?   1. 9 2. 11 3. 23 4. 11.0 5. 23.0 | int a = 12;  int c = 4;  int m = 7;  System.out.println(c + 3.0 \* m % a - 2); |
| Question 3 xx  What is output by the code to the right?   1. Red phish Blue phish 1 phish \n2phish 2. Red phishBlue phish1 phish 2phish 3. Red phish Blue phish 1 phish 2 phish 4. Red phishBlue phish 1 phish \n2phish 5. There is no output due to an error. | System.out.printf("Red phish");  System.out.print("Blue phish");  System.out.println("1 phish \n2phish"); |
| Question 4 xx  What is output by the code to the right?   1. Louisiana 2. SIAN 3. SIA 4. IAN 5. Lousiana | String state = "Lousiana";  state.toUpperCase();  state.substring(3,6);  System.out.println(state); |
| Question 5 xx  Which answer is logically equivalent to the following boolean expression, where p and q are boolean variables?  !p || q && p   1. !(p && !q) && p B. !(p && !q || !p) C. !p || q D. !p || (!q || !p) E. true | |
| Question 6 xx  What is output by the code to the right?   1. 16 2. 256 3. 16.0 4. 256.0 5. There is no output due to an error. | int x=Math.pow(Math.min(5,2),Math.cbrt(64));  System.out.println(x); |
| Question 7 xx  Where is the error in the code to the right?   1. Line 1 2. Line 2 3. Line 3 4. Line 4 5. More than one of these. | int x;  System.out.println(x = 4); //line 1  System.out.println("" + null); //line 2  System.out.println()\u003b //line 3  System.out.println(0=0); //line 4 |
| Question 8 xx  What is output by the code to the right?   1. 1 2. 3 3. 12 4. 123 5. There is no output due to an error. | String tire1 = "flat";  String tire2 = "flat";  if(tire1 == "flat")  System.out.println(1);  System.out.println(2);  else if(tire1 == tire2)  System.out.println(3); |
| Question 9 xx  What is output by the code to the right?   1. 29 2. 30 3. 31 4. 32 5. 33 | int total = 1;  for(int r=0;r<=42;r+=3)  {  total += r % 5;  }  System.out.println(total); |
| Question 10 xx  What is output by the code to the right?   1. [5, 3, 1, 8, 0, 6, 4] 2. [5, 6, 1, 2, 0, 6, 4] 3. [5, 3, 1, 2, 0, 6, 4] 4. [5, 3, 3, 2, 0, 6, 4] 5. There is no output due to an error. | int data[] = {5,3,1,2,0,6,4};  data[data[2]] = data[data[data[3]]]  + data[data[4] + data[2]];  System.out.println(Arrays.toString(data)); |
| Question 11 xx  Suppose file.txt contains the following text:  Testing input with the best Scanner class.  What is output by the code to the right?   1. 11 2. 10 3. 3 4. 2 5. 1 | Scanner scan = new Scanner("file.txt");  int count = 0;  scan.useDelimiter("[st]");  while(scan.hasNext())  {  count++;  scan.next();  }  System.out.println(count); |
| Question 12 xx  What is output by the code to the right?   1. 1094 2. 1086 3. 1215 4. 1195 5. 1205 | String s = "Dooowntowwn";  int c = 0;  for(int i=0;i<s.length();i++)  {  c += s.charAt(i);  }  System.out.println(c); |
| Question 13 xx  What is output by the code to the right?   1. 9 2. 19 3. 8 4. 5 5. There is no output due to an error. | int y = 13;  System.out.println(y&=y-5^y>>2<<4|3); |
| Question 14 xx  What is output by the code to the right?   1. 80 72 2. 10 9 3. 40 36 4. 20 18 5. There is no output due to an error. | System.out.println(Short.BYTES+Long.BYTES);  System.out.println(Byte.BYTES+Double.BYTES); |
| Question 15 xx  Which of the following could replace **<\*1>** in the code to the right without error?   1. Double 2. Object 3. Number 4. B & C 5. All of the above | ArrayList<**<\*1>**> list = new ArrayList<>();  list.add(10);  list.add(42.0);  list.add(33.3); |
| Question 16 xx  What is output by the code to the right?   1. 8 11   1 11   1. 8 11   -5 5   1. 13 8   5 -7   1. 7 10   2 12   1. 8 10   1 10 | int p = 4;  int q = 2;  p = ++q + p++;  q = p++ + ++q;  System.out.println(p + " " + q);  p = --q - p--;  q = p-- + --q;  System.out.println(p + " " + q); |
| Question 17 xx  Which of the following could replace **<\*1>** in the code to the right as a syntactically legal identifier?   1. assert 2. constant 3. native 4. enum 5. volatile | String **<\*1>** = "42"; |
| Question 18 xx  Which sorting algorithm is implemented in the code to the right?   1. Insertion Sort 2. Quick Sort 3. Bubble Sort 4. Merge Sort 5. Bucket Sort | public class Sort{  public static int[] nums;    public static void sort(int l, int h){  if(l < h){  int x = mys(l, h);  sort(l, x);  sort(x+1, h);  }  }    public static int mys(int l, int h){  int m = (l+h)/2;  int p = nums[m];  int i = l-1;  int j = h+1;  while(true)  {  do  {  i++;  }while(nums[i] < p);    do  {  j--;  }while(nums[j] > p);    if(j <= i)  {  return j;  }    **<\*1>**  }  }    public static void main(String[] args){  nums = new int[] {34, 89, 233, 13,  55, 21, 144};  sort(0, nums.length - 1);  System.out.println(Arrays.toString(nums));    }  } |
| Question 19 xx  What replaces **<\*1>** in the code to the right so that the elements originally at indices i and j in array nums are swapped with each other?   1. nums[i] = nums[j]; nums[j] = nums[i]; 2. nums[i]=nums[i]^nums[j]  ^(nums[j]=nums[i]); 3. int temp = nums[i]; nums[j] = nums[i]; nums[i] = temp; 4. int t = i; i = j;   j = t;   1. More than one of these. |
| Question 20 xx  Given an array that contains N elements what are the best, average, and worst case expected running times of the method sort?  **Best Average Worst**   1. O(logN) O(logN) O(logN) 2. O(NlogN) O(NlogN) O(NlogN) 3. O(NlogN) O(NlogN) O(N2) 4. O(logN) O(logN) O(N2) 5. O(NlogN) O(N2) O(N2) |
| Question 21 xx  What is output by the code to the right?   1. 12 2. 18 3. 9 4. 8 5. There is no output due to an error. | int x = 3;  int y = 6;    if((x<<=1) > y && (x\*=2) > y){  System.out.println(x + y);  }  else if(x < 6 || ++x < y--){  System.out.println(x + y);  }  else{  System.out.println(x + y);  } |
| Question 22 xx  What is output by the code to the right?   1. 0 2. 1 3. 3 4. 6 5. There is no output due to an error. | String data[] = {"dog", "dig", "doug",  "dug", "dis", "dat"};  int count = 0;  for(String d : data)  {  if(d.matches("d[ou]+..?")) {count++;}  }  System.out.println(count); |
| Question 23 xx  What is output by the code to the right?   1. 132 2. 130 3. 136 4. 134 5. 138 | String a = Integer.toString(364,7);  int b = Integer.parseInt(a, 4) \* 4;  a = Integer.toHexString(b);  System.out.println(a); |
| Question 24 xx  What is returned by f(20,13)?   1. 36 2. 33 3. 35 4. 30 5. 28 | public static int f(int x, int y)  {  if(x==0 || y==0) {return 1;}    return x + f(y/2, x/2);  } |
| Question 25 xx  What is returned by f(50,42)?   1. 90 2. 92 3. 89 4. 95 5. 93 |
| Question 26 xx  What is returned by f(2020,2134)?   1. 4108 2. 4113 3. 4111 4. 4106 5. 4110 |
| Question 27xx  What is output by the code to the right?   1. 25 2. 58 3. 89 4. 44 5. 76 | int x = 270 >>> 3;  int y = 11 << 2;  x = x ^ y;  y = x & y;  System.out.println(x + y); |
| Question 28 xx  What replaces **<\*1>** in the code to the right?   1. abstract 2. this 3. implements 4. super 5. extends | public class Why{  static int y;  int y1,y2;  Why(){  y++;  }  Why(int y1, int y2){  y++;  this.y1 = y1;  this.y2 = y2;  }    int myst(){  return y1 + y2;  }  }  class Y **<\*1>** Why{  Y(int y1, int y2){  super(y1,y2);  }    int myst(){  return super.y1 \* super.y2;  }  }  //////// client code ////////  public static void main(String[] args){  Why what = new Why(5,3);  Why who = new Y(6,4);    //Question 29  System.out.println(what.myst()); //line 1  System.out.println(who.myst()); //line 2    //Question 30  System.out.println(Why.y); //line 3  } |
| Assume **<\*1>** is filled in correctly. |
| Question 29xx  What is output by lines 1 & 2 in the client code to the right?   1. 15 24 2. 8 10 3. 8 24 4. 15 10 5. There is no output due to an error. |
| Question 30 xx  What is output by line 3 in the client code to the right?   1. 0 2. 1 3. 2 4. 3 5. There is no output due to an error. |
| Question 31 xx  What is output by the code to the right?   1. 305 2. 315 3. 19 4. 20 5. There is no output due to an error. | int x = 1;  int y = 1;  while(x < 20){  y += 2 \* x;  y -= 4;  y += x % 2;  x++  }  System.out.println(x); |
| Question 32 xx  What is output by the code to the right?   1. [Lays, chips, saves, lives] 2. [Lays, hips, aves, ives.] 3. [Lays, chips, saves, lives.] 4. [] 5. There is no output due to an error. | String str = "Lays chips saves lives.";  String arr[] = str.split(" .");  System.out.println(Arrays.toString(arr)); |
| Question 33 xx  What is output by the code to the right?   1. -2147483648 2. -2147483647 3. 0 4. 1 5. There is no output due to an error. | int x = Math.abs(Integer.MIN\_VALUE);  System.out.println(x); |
| Question 34 xx  What is output by the code to the right?   1. 1 2. 1.0 3. 2 4. 2.0 5. There is no output due to an error. | System.out.println(true ? 1 : 2.0); |
| Question 35 xx  What is output by the code to the right?   1. Lamar 2. ACM 3. Computer 4. Science 5. There is no output due to an error. | String arr[] = {"Lamar", "ACM", "Computer",  "Science"};  byte b = 0b1000000;  char c = 'B';  System.out.println(arr[c-b]); |
| Question 36 xx  What is output by the code to the right?   1. null 2. Phoenix 3. Baton Rouge 4. Austin 5. There is no output due to an error. | HashMap<String,String> states = new  HashMap<>();  states.put("Texas", "Austin");  states.put("Lousiana", "Baton Rouge");  states.put("Arizona", "Phoenix");  System.out.println(states.get("Louisiana")); |
| Question 37 xx  What is output by the code to the right?   1. 7 2. 11 3. 9 4. 10 5. There is no output due to an error. | TreeSet<Integer> ts = new TreeSet<>();  ts.add(4);  ts.add(8);  ts.add(3);  ts.add(2);  ts.add(7);  System.out.println(ts.first() + ts.last()); |
| Question 38 xx  What boolean expression is represented by the diagram to the right?   1. (A && B) || (!C ⊕ !(D || E)) 2. (A || B) && (!C ⊕ !(D && E)) 3. A || B && C ⊕ D && E 4. A && B || C ⊕ D || E 5. A || B && !(!C || !(D &&E)) | A close up of a logo  Description automatically generated |
| Question 39 xx  Evaluate the following 8-bit two’s compliment expression. Give your answer as an 8-bit, two’s complement binary value.  110000102 + 001011102 | |
| Question 40 xx  Evaluate the given prefix expression.  + + 1 / + 21 15 6 \* 8 4 | |