The time limit for the contest is 45 minutes. Each correct question is awarded 6 points; no points are given or subtracted if unanswered; 2 points are deducted for an incorrect answer.

Best of Texas 2020-21 Computer Science Test 1

1. $110111_2 + 1010110_2 =$

   a. 10001011_2
   b. 10001001_2
   c. 10001101_2
   d. 10101101_2
   e. none of the above

2. What is the output of the code at right?

```
int x = 2;
int y = 2 * x + 4 * x;
out.print(y);
```

   a. 8
   b. 12
   c. 20
   d. 24
   e. none of the above

3. What is the output of the code at right?

```
int sum = 0;
for (int i = 1; i <= 8; i++){
  sum++;
  sum++;
}
out.print (sum);
```

   a 7
   b. 8
   c. 14
   d. 15
   e. 16

4. What is the output of the code at right?

```
String s = "bestoftexas";
out.print(s.charAt(7));
```

   a. t
   b. e
   c. te
   d. ex
   e. there is no output

5. What replaces <missing code> at right to make *numStu* a class variable shared by all instances of *Student* and hidden from other classes?

```
public class Student {
  <missing code> int numStu = 0;
      //additional code here
}
```

   a. static
   b. private static
   c. final
   d. private final
   e. global private

6. What is the output of the code at right?

a. 10
b. 10.5
c. 11
d. 17
e. 22.5

```
int x = 5;
int y = 3;
int z = 2;
x = x * y + x / z;
out.print(x);
```

---

7. What would replace <missing code> so the while loop at right would immediately terminate when *fact* is *false*, with execution continuing with the first line of code following the loop?

a. break;
b. continue;
c. end;
d. halt;
e. stop;

```
boolean fact = true;
while (true){
    //additional code here
 if (!fact) <missing code>
    //additional code here
}
//additional code here
```

---

8. What is the output of the code at right?

a. 5.4
b. 6.0
c. 6.8
d. 9.0
e. 10.2

```
double num = 3.4;
if (num > 2.5){
  if (num > 4.5)
    num = num * 3;
  else
    num = num + 2;
}
out.print (num);
```

---

9. What is the output of the code at right?

a. -2
b. -1
c. 0
d. 1
e. 4

```
int score = 0;
for (int i = 5; i > 1; i--)
  score++;
out.print(score);
```

---

10. What is the value of i after execution of the code at right?

a. 0
b. 1
c. 5
d. 6
e. 7

```
String s = "algebra";
int i = 0;
do {
  ++i;
   }
while (s.charAt(i) != 'a');
```

11. How many of the comparison operators are evaluated when b is calculated?

a. 0
b. 1
c. 2
d. 3
e. 4

```
int x = 2, y = 4, z = 8;
boolean b;
b = ((x+y < z) || (x*y < z)) &&
    ((x*z < y) && (x+z > y));
```

12. Which of the following replaces <missing code> at right to produce a string containing a greeting, a space, and a name?

a. return g + " " + n;
b. return greeting + " "name;
c. return "greeting " + "name";
d. return greeting + " " + name;
e. return this.greeting " " this.name;

```
public class Student{

    public Student(String g, String n){
      greeting = g;
      name = n;
    }

    public String toString(){
      <missing code>
    }

    private String greeting;
    private String name;
```

13. Which statement declares a variable of type Student and initializes it to Hello Sara?

a. Student s ("Hello", "Sara");
b. Student s ("Hello, Sara");
c. Student s = new Student ("Hello Sara");
d. Student s = new Student ("Hello", "Sara");

14. Which of the following is the escape sequence for a new line character?

a. \\
b. \e
c. \r
d. \n
e. \t

15. What is the output of the code at right?

a. 654
b. 963
c. 1086
d. 1110987
e. 11109876

```
int value = 11;
int [][] t = new int [3][3];
for (int r = 0; r < t.length; r++){
  for (int c = 0; c < t[0].length;
c++){
    t[r][c] = value;
    value--;
  }
}
int c = value;
for (int r = 0; r < t.length; r++){
  out.print(t[r][c]);
}
```

16. What is the output of the code at right?

a. true
b. false
c. 0
d. 1
e. null

```
ArrayList<String> rec1, rec2;
rec1 = new ArrayList<String>();
rec2 = new ArrayList<String>();
rec1.add("1001001");
rec2.add(rec1.get(0));
out.print(rec1 == rec2);
```

---

17. What is returned when the method at right is called with test(-4, 3.4)?

a. -5.8
b. -7.8
c. 3.8
d. -5.2
e. -7.2

```
public static double test(int x, double y){
  x /= 2;
  y = x * y;
  y--;
  return y;
}
```

---

18. Assume the MyQueue class at right is implemented correctly and that the dequeue() method returns the item being dequeued. What is the output?

a. OnceOnceOnce
b. emit anopuecnO
c. a timeuponOnce
d. a timea timea time
e. Onceupona time

```
MyQueue<String> q = new MyQueue<String>;
q.engueue("Once");
q.enqueue("upon");
q.enqueue("a time");

out.print(q.dequeue());
out.print(q.dequeue());
out.print(q.dequeue());
```

---

19. What is the output of the code at right?

a. 0
b. 1
c. .34
d. .034
e. none of the above

```
double x = 3.4;
double y = 10;
double z = x / y;
out.print((int)z);
```

---

20. What is returned when the method at right is called with num(10);

a. 10
b. 60
c. 61
d. 62
e. 64

```
public int num(int x){
  if (x == 1)
    return 10;
  else
    return x + num(x - 1);
}
```

21. What would replace <missing code> in the code at right to get the character at position *i* in the String *zoo*?

a. charAt.zoo(i)
b. substring[i].zoo
c. zoo.charAt(i)
d. zoo.substring[i]
e. zoo.substring[i,i+1]

```
String word = "";
String zoo = "elephant";
String animal = "";
for (int i = 0; i < zoo.length(); i++){
  char ch = <missing code>;
  word = word + ch;
}
out.print(word);
```

---

22. Assuming the <missing code> is filled in correctly in Question 21, what would be output by the code at right?

a. elephant
b. tnahpele
c. tnahpel
d. elephan
e. The code would result in an error.

---

23. What is the output of the code at right?

a. 0
b. 1
c. true
d. false
e. The code would result in an error.

```
String st1 = "Compute";
String st2 = "Computer";
String st3 = st2.substring(0,st2.length());
out.print(st3 == st1);
```

---

24. What is the output of the code at right?

a. 12

b. 13

c. true

d. false

```
int[] ar1 = {10, 12, 14, 16};
int[] ar2 = ar1;
ar1[2]++;
out.print (ar2==ar1);
```

25. What is the output of the code at right?

a. 10 -11
b. -10 11
c. -10 -10
d. -11 -11
e. -1 -2

```
int bx = 10;
int ax = ~bx;
System.out.print(bx + " " + ax);
```

---

26. What is returned by the method at right when called with m("tattarrattat")?

a. true
b. false
c. nothing will be returned

```
public static boolean m (String s) {
  int n = s.length();
  for (int i=0; i < n/2; ++i) {
    if (s.charAt(i) != s.charAt(n-i-1))
      return false;
    if (s.charAt(i) > s.charAt(i+1))
      return false;
    }
  return true;
}
```

---

27. Assume the static method readLine() reads a line from standard input. What is the output of the code at right given the input below?

ab cd ef gh ij

a. 0ab1cd2ef3gh4ij
b. 0ab
c. abcdefghij
d. 0ab 1cd 2ef 3gh 4ij
e. 0ab1cd2ef3gh

```
String st = readLine();

String regex = "\\s+";

String[] sArray = st.split(regex);

for (int i=0; i < sArray.length; ++i)
  out.print(i + sArray[i]);
```

---

28. In the code at right, if the code which inputs values is not inside a try/catch block and the methods used may throw an IOException, which of the following could replace <missing code>?

a. throw IOException
b. throw new IOException
c. throws IOException
d. throws new IOException

```
public static void main(String[] args)
        <missing code>{


  // values input
  // results output
}
```

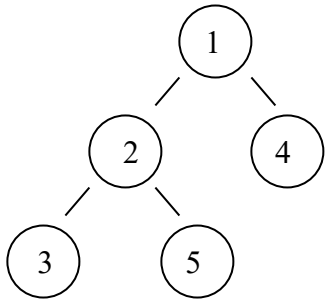
29. What is the output of the code at right?

```
out.print(037 ^ 0x28);
```

a. 3
b. 9
c. 11
d. 28
e. 55

---

30. In what order are the nodes processed in a preorder traversal of the binary tree at right?



a. 1 2 4 3 5
b. 1 2 3 4 5
c. 1 2 4 5 3
d. 1 2 3 5 4
e. 3 2 1 4 5

---

31. What is the output of the code at right?

```
int x = 5^2;
int y = (int)Math.pow(2.0,5.0);

out.print("" + x + y);
```

a. 35
b. 57
c. 332
d. 732
e. 3225

---

32. Which of the following in a regular expression indicates that the previous group should appear zero or more times?

a. *

b. ^

c. +

d. >

33. What replaces <missing code> in the code at right to call the other Animal constructor?

a. Zoo
b. Animal
c. numAnimals
d. this
e. construct

```
public class Animal {
  public Animal() {
    <missing code>(4);
  }
  public Animal(int numAnimals) {
    out.print(numAnimals);
  }
}

public class Zoo extends Animal {
  public Zoo() {
    out.print(8);
  }
}
```

---

34. When <missing code> is filled in correctly, what is output when a Zoo object is constructed?

a. 4
b. 8
c. 48
d. 84
e. There will be no output.

---

35. Which of the following calls to *m* returns 3?

a. m("abxcdxefx")
b. m("abxcdxefghxx")
c. m("abxcdxefxyz")
d. more than one of the above

```
public static int m(String st) {
  String[] ar = st.split("x");
  return ar.length;
}
```

---

36. What would replace <missing code> in the code at right to add all of the numbers in ar and store the result in total?

a. total += ar;
b. for (int i : ar) total += ar[i];
c. for (int i : ar) total += i;
d. for (int i = 0; i<ar.length; ++i)
     total += i;
e. more than one of the above

```
int[] ar = {2, 4, 6, 8};
int total = 0;

<missing code>
```

---

37. Which of the following correctly declares and initializes an iterator for list that can be used to add and remove items from the list?

a. ListIterator<String> iter =
     list.listIterator();
b. Iterator<String> iter =
     list.listIterator();
c. ListIterator<String> iter =
     listIterator();
d. more than one of the above

```
LinkedList<String> list =
                new LinkedList<String>();
// code to initialize list goes here
```

38. What is the output of the code at right?

a. 4
b. 6
c. 8
d. 84
e. 88

```
int x = 4, y = 6, z = 8;
out.print((x>y)?((y<z)?z:y):
                        ((x>z)?x:z));
```

---

39. What is the output of the code at right?

a. 0
b. 24
c. 128
d. 11000
e. 168421

```
int x = 6 << 2;
out.print(x);
```

---

40. If n objects are added to a binary search tree in order from smallest to largest, what is the worst case running time for searching for an object in the tree? Choose the most restrictive correct answer.

a. O(1)
b. O(n)
c. O(log n)
d. $O((\log n)^2)$

.

Computer Science Answer Sheet

1. _____	11. _____	21. _____	31. _____
2. _____	12. _____	22. _____	32. _____
3. _____	13. _____	23. _____	33. _____
4. _____	14. _____	24. _____	34. _____
5. _____	15. _____	25. _____	35. _____
6. _____	16. _____	26. _____	36. _____
7. _____	17. _____	27. _____	37. _____
8. _____	18. _____	28. _____	38. _____
9. _____	19. _____	29. _____	39. _____
10. _____	20. _____	30. _____	40. _____

correct x 6 _____

incorrect x 2 -_____

_____