

University Interscholastic League

Computer Science Competition 2005-06

SAC PRACTICE TEST

- Remember that calculators are NOT permitted.

QUESTION 1	
<p>What is the number AC_{16} when converted to binary?</p> <p>A. 10011100_2 B. 10011010_2 C. 10101100_2 D. 10101010_2 E. 10101011_2</p>	
QUESTION 2	<p>What is the value of $A[3]$ after executing the code to the right?</p> <p>A. 3 B. 4 C. 5</p> <p>D. 12 E. 15</p> <pre>int [] A = {1, 2, 3, 4, 5}; int [] B; B = A; B[3] = 12;</pre>
QUESTION 3	<p>What is output by the code to the right?</p> <p>A. 128 B. 100 C. 64</p> <p>D. 7 E. Nothing</p> <pre>int i = 1; do { i = i*2; } while (i<100); System.out.print(i);</pre>
QUESTION 4	
<p>If the items 15, 27, and 12 are pushed onto a stack in that order, in what order will they be returned by popping the stack?</p> <p>A. 15, 27, 12 B. 12, 27, 15 C. 12, 15, 27 D. 27, 15, 12 E. 27, 12, 15</p>	
QUESTION 5	<p>Which of the following replaces $\langle *1 \rangle$ in the code to the right to check whether the character at position i in string s is a digit?</p> <p>A. $s.charAt(i).isDigit()$</p> <p>B. $Character.isDigit(s.charAt(i))$</p> <p>C. $s.isDigit(i)$</p> <p>D. $s.charAt.isDigit.i$</p> <p>E. More than one of these</p> <pre>public static int process(String s) { int total = 0; for (int i=0; i<s.length(); ++i) { if ($\langle *1 \rangle$) total += s.charAt(i)-'0'; } return total; }</pre>
QUESTION 6	<p>What replaces $\langle *1 \rangle$ in the code to the right to indicate that $main()$ does not return anything?</p> <p>A. void B. zero</p> <p>C. catch D. return</p> <p>E. Nothing</p> <pre>public class Test { public static $\langle *1 \rangle$ main(String[] args) { System.out.print("Hello, world!"); } }</pre>

QUESTION 7

Suppose `Contact` has a public method called `getName()` which returns the name of a contact. Which of these returns the name of a properly declared and initialized `Contact c`?

- A. `c.name.getName` B. `c[0]`
- C. `c.getName()` D. `getName(c)`
- E. `getName(c, Name)`

```
// A class to represent a contact. Assume
// the classes Name, PhoneNumber, and
// Address exist.
```

```
public class Contact {

    // constructors and methods not shown

    private Name name;
    private PhoneNumber home;
    private PhoneNumber office;
    private PhoneNumber cell;
    private PhoneNumber fax;
    private Address address;
}
```

QUESTION 8

Which of these creates an `ArrayList` to which only `Contact` objects can be added?

- A. `ArrayList book();`
- B. `ArrayList book = new ArrayList();`
- C. `ArrayList<Contact> book;`
- D. `ArrayList book =`
`new ArrayList(Contact);`
- E. `ArrayList<Contact> book =`
`new ArrayList<Contact>();`

QUESTION 9

Suppose `book` is declared correctly to be an `ArrayList` which holds objects of type `Contact`. Which of these sets `Contact c` to be the item at index 3 in `book`?

- A. `c = book.get(3)`
- B. `c = (Contact) (book.get(3))`
- C. `c = ((Contact)book).get(3)`
- D. Both A and B
- E. A, B, and C

QUESTION 10

What replaces `<*1>` in the code to the right to make `employeeCount` a class variable shared by all instances of `Employee` and hidden from other classes?

- A. `final` B. `static`
- C. `private final` D. `private static`
- E. `private final static`

```
public class Employee {
    <*1> int employeeCount = 0;
    // other constants and methods
    // not shown
}
```

<p>QUESTION 11</p> <p>What is output by the call <code>output("ctest")</code>?</p> <p>A. <code>ctest</code> B. <code>cteststestteststtt</code> C. <code>ctestcstescstecstcsc</code> D. <code>ctestcstestcstestcstestcstestctest</code> E. Nothing</p>	<pre>public static void output(String s) { int len = s.length(); for (int i=len; i>0; --i) { System.out.print(s); s = s.substring(1); } }</pre>
<p>QUESTION 12</p> <p>What is returned by <code>mixer(0,0,2)</code>?</p> <p>A. -2 B. 4 C. -6 D. 8 E. -10</p>	<pre>public static int mixer(int x, int y, int z) { x += y + z; y -= x + z; z *= x + y; return x + y + z; }</pre>
<p>QUESTION 13</p> <p>Which of these describes the rent of an apartment computed using method <code>computeRent()</code>?</p> <p>A. Proportional to the number of bathrooms, with an additional charge for each bedroom B. Proportional to the number of square feet, with an additional charge for each bathroom C. Proportional to the number of bedrooms, with an additional charge for each square foot D. Proportional to the number of square feet, with an additional charge for each bedroom and bathroom E. Fixed at \$1000</p>	<pre>public class Apartment { // public three argument constructor to // initialize private data not shown // returns monthly rent in dollars public int computeRent(double x, int y) { return (int)(squareFeet*x + numBathrooms*y); } private int numBedrooms; private int numBathrooms; private int squareFeet; }</pre>
<p>QUESTION 14</p> <p>If <code>Apartment a</code> has 1000 square feet, two bedrooms, and three bathrooms, what is returned by the method call <code>a.computeRent(.75, 100)</code>?</p> <p>A. 650 B. 750 C. 850 D. 950 E. 1050</p>	
<p>QUESTION 15</p> <p>What is output by the code to the right when <code>x</code> is 18?</p> <p>A. A B. B C. C D. D E. E</p>	<pre>switch(x % 4) { case 0: System.out.print("A"); break; case 1: System.out.print("B"); break; case 2: System.out.print("C"); break; case 3: System.out.print("D"); break; default: System.out.print("E"); }</pre>

<p>QUESTION 16</p> <p>Which of these is a valid declaration and initialization?</p> <p>A. <code>Cat c = new Animal();</code> B. <code>Animal a = new Cat();</code> C. <code>Cat c();</code> D. <code>Animal a();</code> E. More than one of these</p>	<pre>public class Animal { public Animal() {} // other methods and data not shown } public class Cat extends Animal { public Cat() {} // other methods and data not shown }</pre>
<p>QUESTION 17</p> <p>What is returned by <code>recurse(7)</code>?</p> <p>A. 7 B. 21 C. 28 D. 5040 E. Does not terminate</p>	<pre>public static int recurse(int i) { if ((i == 0) (i == 1)) return 1; else return recurse(i-1) + recurse(i-2); }</pre>
<p>QUESTION 18</p> <p>What replaces <code><*1></code> in the code to the right to make a loop that prints all elements of <code>s</code>?</p> <p>A. <code>Iterator i : TreeSet s</code> B. <code>Integer i : Set s</code> C. <code>Integer Iterator Set i s</code> D. <code>Iterator i : s</code> E. <code>Integer i : s</code></p>	<pre>Set<Integer> s = new TreeSet<Integer>(); // code to add elements to s not shown for (<*1>) System.out.print(i);</pre>
<p>QUESTION 19</p> <p>How many <code>*</code>'s are output by the code to the right when <code>n</code> has the value 10?</p> <p>A. 81 B. 90 C. 100 D. 110 E. 121</p>	<pre>for (int i=0; i<n; ++i) for (int j=0; j<n; ++j) System.out.print('*');</pre>
<p>QUESTION 20</p> <p>What is the running time of the code to the right? Choose the most restrictive correct answer.</p> <p>A. $O(1)$ B. $O(\log n)$ C. $O(n)$ D. $O(n \log n)$ E. $O(n^2)$</p>	

Computer Science Answer Key

UIL Practice 2006

1. C - Hexadecimal digits convert to four binary digits; $A_{16} = 10_{10} = 1010_2$, $C_{16} = 12_{10} = 1100_2$
2. D - Array copies are shallow, so B and A are two names for the same array after the assignment
3. A - This is the smallest power of 2 above 100
4. B - Stacks reverse the order of items pushed on
5. B - To call a static method, place the name of the class in front
6. A - Same as any function with no return value
7. C - To call a regular method, place the name of the object in front
8. E - Notice the new syntax in Java 5 which keeps type information for a container
9. D - It's not necessary in Java 5 to cast the return type of `get()`, but not an error to do so
10. D - The `private` keyword indicates it's hidden and the `static` keyword indicates only one copy all objects share
11. B - The `substring()` method with one argument returns the string from that index to the end (counting from 0)
12. C - Various assignment operators
13. B
14. E - 750 for the square feet and 300 for the bathrooms
15. C - The remainder when dividing 18 by 4 is 2
16. B - References to supertypes can hold subtypes, but not vice versa
17. B - This recursion generates (inefficiently) the Fibonacci numbers
18. E - An example of the new enhanced for loop
19. C - Both `i` and `j` range from 0 to 9, inclusive
20. E