# Computer Science

## Cypress Woods

### December 08, 2012

General Directions:

1) DO NOT OPEN EXAM UNTIL TOLD TO DO SO.
2) **NO CALCULATORS of any kind may be used.**
3) You have 45 minutes to complete this contest. If you are in the process of actually writing an answer when the signal to stop is given, you may finish writing that answer.
4) Papers may not be turned in until forty-five minutes have elapsed. If you finish the test before the end of the allotted time, remain at your seat and retain your paper until told to do otherwise. You may use this time to check your answers.
5) All answers must be written on the answer sheet/Scantron card provided. Indicate your answers in the appropriate blanks provided on the answer sheet or on the Scantron card. Clean erasures are necessary for accurate Scantron grading.
6) You may place as many notations as you desire anywhere on the test paper except on the answer sheet or Scantron card which is reserved for answers only.
7) You may use additional scratch paper provided by the contest director.
8) All questions have ONE and only ONE correct (BEST) answer. There is a penalty for all incorrect answers. **All provided code segments are intended to be syntactically correct, unless otherwise stated (i.e. `error` is an answer choice). Ignore any typographical errors and assume any undefined variables are defined as used.**
9) A reference to commonly used Java classes is provided with the test and you may use this reference during the contest. You may detach the reference sheets from the test booklet but DO NOT DO SO UNTIL THE CONTEST BEGINS.
10) Assume that any necessary import statements for Standard Java 2 Packages and classes (e.g. .lang, .util, System, Math, Double, etc.) are included in any programs or code segments that refer to methods from these classes and/or packages.

Scoring:

1) All questions will receive 6 points if answered correctly; no points will be given or subtracted if unanswered; 2 points will be deducted for each incorrect answer.

Note: Correct responses are based on Java, J2sdk v 7.0, 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.

**QUESTION 1**

What is $123_{10} + 321_5$?

A. $444_{15}$ B. $D1_{16}$ C. $1337_5$ D. $212_{10}$ E. $CW_{35}$

**QUESTION 2**

What is output by the code to the right?

A. 4 B. 8

C. 2 D. 6

E. There is no output due to a runtime error.

```
int x = 1 * 4 + 2;
System.out.println( x );
```

**QUESTION 3**

What is output by the code to the right?

A. 13 B. 20

C. 19 D. 21

E. james

```
int bond = 007;
for(int i = -3; i<10; i++)
    bond++;
System.out.println(bond);
```

**QUESTION 4**

What is output by the code to the right?

A. ello B. Hello

C. World? D. ello World?

E. There is no output due to a runtime error.

```
String s1 = "Hello World?";
s1 = s1.substring(1,5);
System.out.println(s1);
```

**QUESTION 5**

What is output by the code to the right?

A. 4 B. 3 C. 1 D. 0

D. There is no output due to a syntax error.

```
int a = 123;
int b = 2;
System.out.println(3 + a % b);
```

**QUESTION 6**

What is output by the code to the right?

A. cywo B. cwoods

C. cw D. cyw

E. cdub

```
String cy = "cy";
String wd = "woods";
wd = wd.substring(0,1);
cy = cy.charAt(0) + wd;
System.out.println(cy);
```

**QUESTION 7**

What is output by the code to the right?

A. 0.5 B. 7.0 C. 4.1 D. 3.4

E. There is no output due to a syntax error.

```
Double[] d = {.1,.2,3.,4.};
System.out.println(d[2] + d[3]);
```

**QUESTION 8**

What is output by the code to the right?

A. false false B. false true

C. true true D. true false

E. There is no output due to a syntax error.

```
System.out.print((true&&false)+" ");
System.out.print(true^false);
```

**QUESTION 9**

What replaces **<*1>** in the code to the right so that the instance variables `str` and `funny` can only be accessed within the `Joke` class?

A. `public`

B. `protected`

C. `nonpublic`

D. `private`

E. `default`

Assume **<*1>** has been filled in correctly.

```
class Joke{
 <*1> String str;
 <*1> boolean funny;
 public Joke(String s){
    str = s;
 }
 public void setFunny(boolean f){
    funny = f;
 }
 public String toString(){
    return funny + str;
 }
}
```

**QUESTION 10**

What is output by the line marked `//1` in the client code to the right?

A. `falsefalsechicken?`

B. `truefalsechicken?`

C. `truechicken?`

D. `falsechicken?`

E. There is no output due to a runtime error.

**QUESTION 11**

What is output by the line marked `//2` in the client code to the right?

A. `truefalsethe road`

B. `falsefalsethe road`

C. `truethe road`

D. `falsethe road`

E. There is no output due to a runtime error.

```
//////// client code ///////

String j = "falsechicken?";
Joke j1 = new Joke(j);
System.out.println(j1); //1

j1 = new Joke("the road");
j1.setFunny(true);
System.out.println(j1);  //2
```

**QUESTION 12**

What is output by the code to the right?

A. `1`

B. `2`

C. `23`

D. `13`

E. `12`

```
double a = 1/3;
if( a <= 1 )
  System.out.print(1);
if( a <= 0 )
  System.out.print(2);
if( a * 3 >= 1)
  System.out.print(3);
```

**QUESTION 13**

What is output by the line marked `//1` in the client code to the right?

A. `30 20`

B. `15 20`

C. `30 25`

D. `15 25`

E. `15 30`

**QUESTION 14**

What is output by the line marked `//2` in the client code to the right?

A. `10 10`

B. `5 30`

C. `5 10`

D. `10 30`

E. `30 10`

**QUESTION 15**

What is output by the line marked `//3` in the client code to the right?

A. `10 20`

B. `5 10`

C. `20 30`

D. `10 30`

E. `0 0`

```
class A{
  private int a;
  private int b;
  public A(int aa, int bb){
     setA(aa);
     setB(bb);
  }
  public void setA(int aa){
     a = aa;
  }
  public void setB(int bb){
     b = bb;
  }
  public String toString(){
     return a + " " + b;
  }
}

class B extends A{
  public B(){
     super(5, 10);
  }
  public void setA(int aa){
     super.setA(aa * 2);
  }
  public void setB(int bb){
     super.setB(bb * 3);
  }
}

/////// client code ///////

A a = new A(30,25);
a.setB(20);
a.setA(15);
System.out.println (a); //1

B b = new B();
System.out.println (b); //2

a = b;
a.setA(10);
b.setB(10);
System.out.println (b); //3
```

**QUESTION 16**

What is output by the code to the right?

A. `santa` B. `santa9`

C. `santa+4+5` D. `santa45`

E. There is no output due to a runtime error.

```
String s = "santa";
System.out.println( s + 4 + 5 );
```

**QUESTION 17**

What is output by the code to the right?

A. `36`

B. `36.0`

C. `48`

D. `48.0`

E. There is no output due to a syntax error.

```
double x = Math.pow(2,5);
double y = Math.sqrt(16);
System.out.println( x + y );
```

**QUESTION 18**

What is output by the code below?

`System.out.println(test("a"));`

A. `1` B. `0`

C. `2` D. `3`

E. There is no output due to a syntax error.

**QUESTION 19**

What is output by the code below?

`System.out.println(test("c"));`

A. `0` B. `1`

C. `2` D. `3`

E. There is no output due to a syntax error.

```
public int test(String java7)
{
   switch (java7)
   {
      case "97": return 0;
      case  "a": return 1;
      case "99": return 2;
   }
   return 3;
}
```

**QUESTION 20**

What is output by the code to the right?

A. `abc`

B. `0.0`

C. `true`

D. `1.0`

E. There is no output due to a runtime error.

```
String regex = "abc";
String matches = "println";
System.out.println(0.0*0.0);
```

**QUESTION 21**

What is output by the code to the right?

A. `0.0`

B. `Infinity`

C. `NaN`

D. There is no output due to a syntax error.

E. There is no output due to a runtime error.

```
double unstoppable_force =
  Double.Positive_INFINTY;

double immovable_object = 0.0;

out.println(unstoppable_force *
            immovable_object);
```

**QUESTION 22**

What is output by the code to the right?

A. `5` B. `16` C. `1` D. `6`

E. There is no output due to a syntax error.

```
int a = 5;
int b = 7;
int c = 4;
out.println( a ^ b ^ c );
```

**QUESTION 23**

What is output by the code to the right?

A. `192` B. `00192` C. `%05d`

D. There is no output due to a syntax error.

E. There is no output due to a runtime error.

```
int pie = 192;
String pinkie = "%05d";
System.out.printf( pinkie , pie );
```

**QUESTION 24**

Which of the following best replaces **`<*1>`** to the right to create a new `ArrayList` of type `E`?

A. `new E<ArrayList>()`

B. `new E.ArrayList()`

C. `new ArrayList.<E>()`

D. `new ArrayList<E>()`

E. `new ArrayList()<E>`

**QUESTION 25**

Assuming **`<*1>`** is filled correctly, what is output by the client code?

A. `3 10 6 9 1`

B. `1 3 6 9 10`

C. `1 9 6 10 3`

D. `10 9 6 3 1`

E. `3 10 6 9`

**QUESTION 26**

What is the Big O runtime of `remove()` when n=`size`? Choose the most restrictive, correct answer.

A. O(n)

B. O(1)

C. $O(\log_2 n)$

D. $O(n^2)$

E. $O(2^n)$

**QUESTION 27**

What type of data structure does the `Structure` class most closely resemble?

A. An array based list

B. A stack

C. A set

D. A queue

E. A min heap

```
class Structure<E>{
  private ArrayList<E> ar;
  private int[] pt;
  private int ed, size;
  public Structure(int n){
     ar = <*1>;
     pt = new int[n+1];
     for(int i = 0; i<n+1; i++)
        ar.add(null);
  }
  public void add(E e){
     size++;
     pt[ed] = ++ed;
     ar.set(ed, e);
  }
  public E remove(){
     E e = ar.get(pt[0]);
     pt[0] = pt[pt[0]];
     size--;
     return e;
  }
  public boolean empty(){
     return size == 0;
  }
}

///// client code ////

Structure<Integer> st;
st = new Structure<Integer>(10);
st.add(1);
st.add(9);
st.add(6);
st.add(10);
st.add(3);
while(!st.empty())
  out.print(st.remove() + " ");
```

**QUESTION 28**

What is output by the following code?

```
out.println(recure(3)%5);
```

A. `0` B. `1`

C. `2` D. `3`

E. `4`

**QUESTION 29**

What is output by the following code?

```
out.println(recure(5)%5);
```

A. `0` B. `1`

C. `2` D. `3`

E. `4`

```
public int recure(int c){
     if(c==0)return 1;
     int total = 0;
     for(int i = 0;i<c;i++)
        total+=recure(c-1);
     return total+1;
}
```

**QUESTION 30**

What is output by the code to the right?

A. `true` B. `false` C. `null`

D. There is no output due to a syntax error.

E. There is no output due to a runtime error.

```
ArrayList a = new ArrayList();
out.print(a instanceof Collection);
```

**QUESTION 31**

Which of the following does not cause a syntax error?

A. `A a = new B();` B. `B a = new A();`

C. `C a = new A();` D. `C a = new C();`

E. `A a = new C();`

**QUESTION 32**

What is output by the client code to the right?

A. `35`

B. `15`

C. `10`

D. There is no output due to a syntax error

E. There is no output due to a runtime error

**QUESTION 33**

What is output by the client code to the right if the value of `n` were changed to `10`?

A. `20`

B. `50`

C. `45`

D. There is no output due to a syntax error

E. There is no output due to a runtime error

```
class A implements C{
   public int get(){
      return 7;
   }
}

class B implements C{
  public int get(){
      return 2;
  }
}

interface C{int get();}

////////////////////////////////////

C c;
int n = 5;
int total = 0;
for(int i = 0;i < n;i++){
    if(i>=5)
       c = new A();
    else
       c = new B();
    total+=c.get();
}
System.out.println(total);
```

**QUESTION 34**

What is output by line `//1` in the code to the right?

A. `9`
B. `4`
C. `7`
D. `5`
E. `3`

**QUESTION 35**

What is output by line `//2` in the code to the right?

A. `[5, 7, 9, 10, 20]`
B. `[5, 7, 20, 10, 9]`
C. `[4, 5, 9, 7, 20, 10]`
D. `[20, 10, 5, 7, 9]`
E. `[3, 5, 4, 9, 7, 20, 10]`

```
PriorityQueue<Integer> que = new
PriorityQueue<Integer>();
que.add(10);
que.add(3);
que.add(5);
que.add(7);
que.add(20);
que.add(4);
que.add(9);
System.out.println(que.remove()); //1
que.remove();
System.out.println(que); //2
```

**QUESTION 36**

What is output by the code to the right?

A. `true`
B. `false`
C. `0`
D. `1`
E. There is no output due to a runtime error

```
String s = "I like regex";
out.println(s.matches(".*"));
```

**QUESTION 37**

What is output by the code to the right?

A. `true`
B. `false`
C. `0`
D. `1`
E. There is no output due to a runtime error

```
String s = "Do you like regex?";
String r = "(.*(.).*\\2.*){3}";
out.println(s.matches(r));
```

**QUESTION 38**

What is output by the code to the right?

A. `0`
B. `1`
C. `2`
D. `3`
E. There is no output due to a runtime error

```
String s = "Because if you don't ";
s+= "this might be difficult";
String r = "(.+)(?=.\\w)(?<!.\\1).*+";
String a = s.replaceAll(r,"$0");
out.println(a.length()%4);
```

**QUESTION 39**

What is output by the code to the right?

A. `0`

B. `1`

C. `2`

D. `3`

E. There is no output due to a runtime error

```
int p = 7;
int b = 4;
int d = 2;
int q = 4;
System.out.println((p<<d^b)%q);
```

**QUESTION 40**

What is output by the code to the right?

A. `2147483847`

B. `2147483647`

C. `2148473647`

D. `2148473847`

E. `Integer.MAX_VALUE`

```
out.println(Integer.MAX_VALUE);
```