Computer Science
Cypress Woods
December 12, 2015

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.

Cypress Woods Computer Science Contest December 12, 2015

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

Which is equivalent to $2BC_{16}$ – 110100111_2?

A. 347_9 B. 525_8 C. 545_7 D. 1141_6 E. 2112_5

QUESTION 2

What is output by the code to the right?

A. `24.0` B. `24`

C. `2.33` D. `1`

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

```
int a = 6;
int b = 4;
int c = a * b;
System.out.println(c);
```

QUESTION 3

What is output by the code to the right?

A. `woo\nhoo\tyay` B. `woo-hoo,yay\-`

C. `woo` D. `woo`

`hoo yay\n` `hoo yay`

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

```
String s = "woo\nhoo\tyay\\n";
System.out.print(s);
```

QUESTION 4

What is output by the code to the right?

A. `4` B. `3`

C. `0.0` D. `3.0`

E. `4.0`

```
System.out.println(Math.min(Math.max(3,4),
                   Math.min(3,4))*1.0);
```

QUESTION 5

What is output by the code to the right?

A. `9` B. `8` C. `25`

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

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

```
String s = "";
for(int x = 1; x < 10; x+=2){
    x*=x;
    s = x;
}
System.out.println(s);
```

QUESTION 6

What is output by the code to the right?

A. `120` B.`130` C. `130.0`

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

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

```
int y = 10;
double a = (double)'x';
System.out.println(a+y);
```

QUESTION 7

Which of the following boolean expressions evaluate to true if and only if P, Q, and R are all false?

A. !P && (!(P || Q) || R)

B. P || R && Q || !P && !R || !Q

C. !((!P && R) || (Q || !P && R) && P || R || Q || R || Q || R || P || P || P || Q || R || !Q)

D. !P && (Q || (P && R) || (!R && !(Q || !P)))

E. !P && !Q && !R && !(P || Q || R)

QUESTION 8

What is output by the code to the right?

A. `cywoods` B. `CYWOODS` C. `Cywoods`

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

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

```
String s = "cywoods";
s.toUpperCase();
System.out.println(s);
```

QUESTION 9

What is output by the code to the right?

A. `String7`

B. `StringInteger`

C. `null`

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

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

```
String String = "String";
int Integer = 7;
System.out.println(String + Integer);
```

QUESTION 10

What is output by the client code to the right?

A. `10` B. `1010` C. `10.0`

D. None of the above

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

```
int a = 10;
System.out.println(Integer.toString(a));
```

QUESTION 11

What is output by the code to the right?

A. `7`

B. `4`

C. `3`

D. `5`

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

```
String s="bat";
String r="cat";
System.out.println(s.compareTo(r)+4);
```

QUESTION 12

What is the output of the code on the right?

A. `0` B. `15`

C. `10` D. `5`

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

```
int a, b, c;
a = b = c = 5;
System.out.println( a + b + c );
```

QUESTION 13

What is the output of the code on the right?

A. `3284589` B. `328453`

C. `565` D. `ABC34`

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

```
System.out.printf("%7d", 5567L * 59);
```

QUESTION 14

What does the code on the right output?

A. `-1.0` B. `1`

C. `0.0` D. `0`

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

```
int i=122,ii=144;
i/=i+=i*=4*ii;
System.out.println(Math.pow(i,ii));
```

QUESTION 15

What is the output of the line 1?

A. `[1, 95]` B. `[95, 1]`

C. `[5, 19]` D. `null`

E. `[19, 5]`

QUESTION 16

What is the output of the line 2?

A. `true` B. `false`

C. `true false` D. `null`

E. There is no output due to a runtime error

```
public static int[] a(int b) {
  for(int i = 2; i < b; i++) {
     if(b % i == 0 &&
     c(i) && c(b / i)) {
        return
        new int[]{b / i, i};
     }
  }
  return null;
}
public static boolean c(int b) {
  b+=b+=b+=b*=2;
  if(b%3==0){
     return true;
  }
  return false;
}
//Client code
//line 1
out.println(Arrays.toString(a(95));
//line 2
System.out.println(c(2) && c(5) && c(17));
```

QUESTION 17

What does the code on the right print out?

A. `false` B. `true`

C. `TRUE`

D. There is no output due to a compile error

E. There is no output due to a runtime error

```
BigInteger b=new BigInteger("20");
b=b.add(new BigInteger("17"));
b.add(new BigInteger("3"));
System.out.println(b.isProbablePrime(100));
```

QUESTION 18

What is the output of the code on the right?

A. `False` B. `true`

C. `false` D. `null`

E. None, there is a runtime error

```
boolean tru=false;
boolean fals=true;
boolean fin=false;
boolean test=(fals||tru)||(true&&fals);
fin=
((tru&&false)||true&&(test||fals)||fals&&true)||
(true&&fin||(test)||fals&&tru);
System.out.println(fin ? false : true );
```

QUESTION 19

What is the amount of bit storage in the primitive type double?

A. 4 B. 32 C. 64 D. 8 E. 16

QUESTION 20

What is the output of the code on the right?

A. `omputer y is funnier than science` (All on one line)

B. `null`

C. r`omputir si is yoiin funnoir than`

D. r`omputir si is funniir than yoiin`

E. None, an error occurred

```
String s="computer science is funnier than you";
s=s.substring(s.indexOf("o"),s.lastIndexOf("o"));
s=s.replace("e","i");
s=s.charAt(6)+s+s.charAt(0);
String[] str=s.split("c");
System.out.println(str[0]+str[2]+str[1]);
```

QUESTION 21

What is equivalent to $POTATO_{36} - ROODE_{36}$?

A. $QX4MGA_{36}$ B. $OFRSAJ_{36}$ C. $OX4MGA_{36}$ D. $PTR5AJ_{36}$ E. $HF456A_{36}$

QUESTION 22

What does the code on the right output?

A. 157 B. 156

C. 154 D. 155

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

```
int _=12,__=144;
_+=__;
System.out.println(_);
```

QUESTION 23

What is the output of the code on the right?

A. 27.2

B. 13.6

C. 8.8

D. The code runs, but nothing is printed out

E. There was no output due to a compile error.

```
double c = 6.8 * 2;
```

QUESTION 24

What is output by the code?

A. LennySteveDerp

B. DogeSteveDerp

C. DogenullDerp

D. Dogenullnull

E. There is no output due to an error.

```
List<String> list = new ArrayList<>();
for (String s : new String[]
{"GrumpyCat","Spoderman","Doge"})
    list.add(s);
String[] whatsLeft =
{"NickCage","RichardBush",
"Lenny","Steve","Derp"};
list.toArray(whatsLeft);
out.println(""+whatsLeft[2]+whatsLeft[3]+
whatsLeft[4]);
```

QUESTION 25

What does class Group demonstrate?

A. Composition B. Inheritance

C. Overriding D. A and C

E. A, B, and C

QUESTION 26

What best fills **<1>** and **<2>** so that the code runs and `a` is assigned to `age` and `n` is assigned to `name`?

A.
```
super();
this.a = a;
this.n = n;
```

B.
```
super();
super.a = a;
super.n = n;
```

C. `super(a, n);` D. `super(n, a);`

E.
```
this.a = a;
this.n = n;
```

QUESTION 27

Assuming that the previous code blanks have been correctly filled, why does the code still not compile?

A. 0b0 is not a valid integer literal

B. Not all code paths in the talk method in Gamer returns a value

C. List is abstract and cannot be directly instantiated

D. The list constructor needs a generic type argument

E. There cannot be multiple classes in one file

QUESTION 28

Consider the client code below.

```
new Gamer(3, 3, “Fata13ty”).talk();
```

What does the invocation of `talk()` demonstrate?

A. Early Binding B. Static Binding

C. Special Binding D. Late Binding

E. Fixed Binding

QUESTION 29

What does the class Person extend?

A. Object B. Itself - Person

C. Class D. Type

E. Nothing, it derives from no base class

```
class Person {
 public String name;
 public int age;
 public Person(int a, String n) {
   name = n; age = a;
 }
 public String toString() {
   return talk();
 }
 public String talk() {
   return "Hello, my name is " +
   name;
 }
}
class Gamer extends Person {
 public int cps;
 public Gamer(int c, int a, String n){
   <1>
   cps = c;
 }
 public String talk() {
   switch(rank()) {
   case "HAXOR":
   return "POWER OVERWHELMING!!!";
   case "MLG PRO":
   case "CHASE":
   return "OUTTA MA WAY, SCRUBZ!";
   default:
   return "SERIOUSLY? CAMPERS?";
   }
 }
 public String rank() {
   if(cps >= 60) return "HAXOR";
   if(cps >= 30) return “MLG PRO”;
   if(cps >= 12)
     return “CHASE UHEREK”;
   if(cps >= 6) return “OK”;
   if(cps >= 3) return “MEH”;
   if(cps >= 1) return “NOOB”;
   return “SCRUB”;
 }
}
class Weeb extends Person {
 public String talk() {
   return “Nano desu!!!”;
 }
 public Weeb(int a, String n) {
   <2>
 }
}
class Group {
 public List<Person> people =
 new List<>();
 public String toString() {
   String d = “”;
   int a = 00, b = 0x0, c = 0b0;
   for(Person p : people) {
     d += p.toString() + "\n";
   } return d;
 }
}
```

QUESTION 30

What does the code print out?

A. C00LNESSFUN

B. C001NESSFUN

C. C001NE22FUN

D. There is no error, but there is no output.

E. There is no output due to an error.

```
int a=256;
switch(a%3){
    case 0 : out.print("C00LNESS"); break;
    case 1 : out.print("C001NESS"); break;
    case 2 : out.print("C001NE22"); break;
}
out.println("FUN");
```

QUESTION 31

What is the output of the client code?

A. 36

B. 37

C. 38

D. 39

E. 32

```
static int a(int b) {
  int x = 37;
  try { return a(b++) % 39; }
  catch(StackOverflowError e) { return x; }
  finally { x = 32; }
}
//Client code
System.out.println(a(30));
```

QUESTION 32

What is output by the code to the right?

A. -21474836472147483647

B. -2147483648214748364 7

C. -2147483648214748364 8

D. 2147483648214748364 8

E. -21474836472147483648

```
int a = 1;
long b = 1;
while(a == b) {
  a <<= 1; b <<= 1;
}
System.out.println(""+a+b);
```

QUESTION 33

What is the output of the code on the right?

A. 11111 B. 1

C. 1111 D. 111111

E. 1111111

```
System.out.print(
Integer.toBinaryString(14 ^ 17 & 120 | 5));
```

QUESTION 34

What is the output of the code on the right?

A. 290046002e00%
16004900100.5000

B. 00290046002e%
00160049100.5000

C. 00290046002e%n
00160049100.5000

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

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

```
int a = 014;
long b = 17;
double c = 12.5;
System.out.printf(
"%04d%04d%04x%%%n%04d%04x%04.4f%n",
a+=b, b+=a, b--, b---a, a+b, (b+=b)+c);
```

QUESTION 35

What is the output of the code on the right?

A. 3200

B. 0032

C. 32

D. 0320

E. None, an infinite loop occurred

```
long a, b, c;
a = b = c = 0;
while(a < 32) {
 c++;
 if(c < 0) { c = 0; b++; }
 if(b < 0) { b = 0; a++; }
}
System.out.println(""+a+b+c);
```

QUESTION 36

What is the output of the code on the right?

A. -99

B. 88

C. 99

D. -88

E. 110

```
static int a(int b) {
  return b > -3 ? a(--b) + a(--b) : -11;
}

//Client code
System.out.println(a(1));
```

QUESTION 37

What is the output of the code on the right?

A. yuudachiyuudachiyuudachiyuudachidyuudachipoi (All on one line)

B. poipoipoipoipoipoipoipoibuf

C. yuudachiyuudachipoipoibuf

D. poipoipoipoipoipoipoipoipoipoipoipoipoipoipoi (All on one line)

E. None, an error occurred

```
StringBuffer buf =
new StringBuffer("poi");
buf.append(buf)
.append(buf.append(buf)).append("buf");
System.out.println(buf.toString()
.replaceAll("poipoipoi", "yuudachi"));
```

QUESTION 38

What is output by code to the right?

A.
```
[1, 2, 3]
[4, 5, 6]
[7, 8, 9]
```

B.
```
[1, 4, 7]
[2, 5, 8]
[3, 6, 9]
```

C.
```
[0, 4, 7]
[2, 0, 9]
[3, 6, 0]
```

D.
```
[0, 0, 0]
[0, 0, 0]
[0, 0, 0]
```

E.
```
[0, 2, 3]
[4, 0, 6]
[7, 8, 0]
```

```
int[][] t = {{1,2,3},{4,5,6},{7,8,9}};
for(int x = 0; x < 3; x++) {
  for(int y = 0; y < 3; y++) {
     t[x][y]^=t[y][x];
     t[y][x]^=t[x][y];
     t[x][y]^=t[y][x];

     t[x][y]^=t[y][x];
     t[y][x]^=t[x][y];
     t[x][y]^=t[y][x];

     t[x][y]^=t[y][x];
     t[y][x]^=t[x][y];
     t[x][y]^=t[y][x];
  }
}
for(int[] a : t)
  out.println(Arrays.toString(a));
```

QUESTION 39	
Free Response Question: Write the prefix equivalent of the postfix expression on the right.	D A % R / T ^ H V A + + - D E * * R /
QUESTION 40	
Free Response Question : Add the values, from left to right, to a min-heap. Then take all the values from the min-heap using in-order traversal and add them into a max-heap. Then take all the values from the max-heap in level order and add them into a binary search tree with ties broken to the left. What are the values in the post-order traversal of the binary search tree?	212 211 223 32 454 -11 0 3134 -898