Signature ______________________ **Name _________________________**

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CSE 11
Midterm
Fall 2009

Page 1 ___________ (12 points)

Page 2 ___________ (24 points)

Page 3 ___________ (30 points)

Page 4 ___________ (23 points)

Page 5 ___________ (12 points)

Total ___________ (101 points = 96 base points + 5 points EC [5%])

(Partial) Operator Precedence Table

Operators				Associativity
!	++	-- (pre & post inc/dec)		right to left
*	/	%		left to right
+	-			left to right
<	<=	>	>=	left to right
==	!=			left to right
&&				left to right
||				left to right
=				right to left

1) What are the values of `x` and `y` (left) and `a` and `b` (right) after the following code segments are executed?

```
int x = 2, y = 4;

if ( x++ >= 3 || --y >= 3 )
  x = x++ + --y;
else
  x = ++x + y--;
```

```
x =
y =
```

```
int a = 2, b = 4;

if ( a++ >= 3 && --b >= 3 )
  a = a++ + --b;
else
  a = ++a + b--;
```

```
a =
b =
```

Assume we have a Java source file named Program.java and it uses at least one class in the objectdraw library.

Write the full Unix command to compile this Java program.

____

This command will produce a file named:

____

Write the full Unix command to run this as a Java application.

____

Assume we have correctly written a Program.html file. Write the full Unix command to run the above program as an applet.

____

2) Given the following definition of class Thing1, what is the output of the Java application Question2?

```
public class Thing1
{
  private int count;

  public Thing1( int count )
  {
    this.count = count;
  }

  public int getCount()
  {
    return this.count;
  }

  public void setCount( int count )
  {
    this.count = count;
  }

  public String toString()
  {
    if ( this.count == 1 )
      return "one";
    else if ( this.count == 2 )
      return "two";
    else if ( this.count == 3 )
      return "three";
    else
      return "too many";
  }

  public static void swap1( Thing1 t1, Thing1 t2 )
  {
    Thing1 temp;

    temp = t1;
    t1 = t2;
    t2 = temp;
  }
}
```

```
public class Question2
{
  public static void main( String[] args )
  {
    Thing1 first = new Thing1( 3 );
    Thing1 second = new Thing1( 4 );

    System.out.println( first.toString() );
    System.out.println( second.toString() );

    Thing1.swap1( first, second );

    System.out.println( first.toString() );
    System.out.println( second.toString() );

    Thing1 third = new Thing1( 1 );
    Thing1 fourth = new Thing1( 2 );;
    second.setCount( third.getCount() );
    first = fourth;

    System.out.println( first.toString() );
    System.out.println( second.toString() );
    System.out.println( third.toString() );
    System.out.println( fourth.toString() );

    System.out.println(
               first.toString().equals( fourth.toString() )
                      );
    System.out.println(
               second.toString().equals( third.toString() )
                      );
    System.out.println( first == fourth );
    System.out.println( second == third );
  }
}
```

Output

____

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3) What output is produced by the following program?

```
 1  public class Test3
 2  {
 3    private static int a;
 4    private int b;
 5    private int c;

 6    public static void main( String[] args )
 7    {
 8      Test3 ref = new Test3();

 9      ref.method1( ref.c );
10    }

11    public Test3()
12    {
13      c = 3;
14    }

15    public void method1( int x )
16    {
17      int c = x++;
18      int b;

19      b = c + 3;
20      a = b + 2;

21      System.out.println( "Test3.a = " + Test3.a );
22      System.out.println( "this.b = " + this.b );
23      System.out.println( "this.c = " + this.c );
24      System.out.println( "c = " + c );
25      System.out.println( "b = " + b );
26      System.out.println( "a = " + a );
27      System.out.println( "result = " + method2( c + b ) );
28      System.out.println( "Test3.a = " + Test3.a );
29      System.out.println( "this.b = " + this.b );
30      System.out.println( "this.c = " + this.c );
31      System.out.println( "a = " + a );
32      System.out.println( "b = " + b );
33      System.out.println( "c = " + c );
34      System.out.println( "x = " + x );
35    }

36    private int method2( int x )
37    {
38      int a = x;
39      int c = this.c + Test3.a;

40      x = b = a + c;

41      System.out.println( "Test3.a = " + Test3.a );
42      System.out.println( "this.b = " + this.b );
43      System.out.println( "this.c = " + this.c );
44      System.out.println( "a = " + a );
45      System.out.println( "b = " + b );
46      System.out.println( "c = " + c );

47      Test3.a = a + 2;
48      this.b = b + c;

49      return x + 3;
50    }
51  }
```

Output

```
Test3.a = ________
this.b = ________
this.c = ________
c = ________
b = ________
a = ________
Test3.a = ________
this.b = ________
this.c = ________
a = ________
b = ________
c = ________
result = ________
Test3.a = ________
this.b = ________
this.c = ________
a = ________
b = ________
c = ________
x = ________
```

Use the numbers below to identify various program parts.

1) static method
2) constructor
3) class definition (type)
4) instance method
5) static variable
6) local variable
7) instance variable
8) formal parameter
9) actual argument

______ `Test3()` on line 11

______ `method2()` on line 36

______ `Test3` on line 1

______ `ref.c` on line 9

______ `main()` on line 6

______ `a` on line 38

______ `c` on line 5

______ `a` on line 3

______ `x` on line 15

______ `ref` on line 8

4) What gets printed in the following code fragment?

```
final int MAX = 6;
int i = 3;
int j;

while ( ++i < MAX )
{
  j = 12;

  while ( j > MAX + i )
  {
    System.out.println( i + " " + j );
    j--;
  }

  System.out.println( i + " " + j );
}
```

Output

What is the output of this recursive method if it is invoked as `ref.mystery( 6 );` ? Draw Stack Frames to help you answer this question.

```
int mystery( int a )
{
  int b = a + 3;

  if ( b > 5 )
  {
    System.out.println( a + " " + b );
    a = b + mystery( a - 2 );
    System.out.println( a + " " + b );
  }
  else
  {
    System.out.println( "Cease" );
    System.out.println( a + " " + b );
    b = a - 3;
    System.out.println( a + " " + b );
  }

  return a + b;
}
```

Output

5) Given the following definitions:

```
public interface Speakable
{
  public String speak();
}
```

```
public class Puppy implements Speakable
{
  private static final String
                 PUPPY_SPEAK = "Bark";

  public Puppy()
  {
    // ctor initialization here
  }

  public String speak()
  {
    return PUPPY_SPEAK;
  }

  public String wag()
  {
    return "wag wag";
  }
}
```

```
public class Kitty implements Speakable
{
  private static final String
                 KITTY_SPEAK = "Meow";

  public Kitty()
  {
    // ctor initialization here
  }

  public String speak()
  {
    return KITTY_SPEAK;
  }

  public String sleep( int time )
  {
    return time + " second cat nap";
  }
}
```

And the following variable definitions:

```
private Puppy puppy;
private Kitty kitty;
private Speakable speakable;
```

Indicate what gets printed with the following statements (each statement is executed in the order it appears).

```
puppy = new Puppy();
kitty = new Kitty();

speakable = kitty;

System.out.println( speakable.getClass().getName() );   ____________________________

System.out.println( speakable.speak() );                ____________________________

speakable = puppy;

System.out.println( speakable.getClass().getName() );   ____________________________

System.out.println( speakable.speak() );                ____________________________

System.out.println( puppy.speak() );                    ____________________________

System.out.println( puppy.wag() );                      ____________________________

System.out.println( kitty.speak() );                    ____________________________

System.out.println( kitty.sleep( 1000 ) );              ____________________________
```

What two things would we need to change in Speakable.java, Puppy.java, and/or Kitty.java in order to have Kitty and Puppy objects listen for and handle ActionEvents? Be specific what needs to change in which file(s).

1)

2)

Scratch Paper