Question 1 [10 points, 2 points each]

The code given below is correct: it compiles without errors. I have added some extra spacing to make this question easier to answer.

Circle, and identify by number, one and only one example of each of the following items in the code below. If you believe no example exists, write “no example” next to that item in the list. To show you how I want the question answered, the first one is done for you.

1. access control modifier
2. expression
3. argument list
4. local variable declaration
5. reserved word
6. assignment statement

```java
package control;

public class Device {

    private component.Screen _viewer;

    public Device() {
        component.Image pic;
        pic = new component.Image();
        pic.refresh();
        _viewer = new component.Screen();
        _viewer.display( pic );
    }
}
```
Question 2 [9 points]

For each of the following questions, select the **BEST** answer from the available choices.

[1 POINT] Where in memory is a local variable stored?
   a) secondary storage
   b) heap
   c) static region
   d) runtime stack

[1 POINT] Where in memory is an object stored?
   a) secondary storage
   b) heap
   c) static region
   d) runtime stack

[1 POINT] Which of the following has the same value as 101\(_2\)?
   a) 3\(_{10}\)
   b) 5\(_{10}\)
   c) 11\(_{10}\)
   d) 101\(_{10}\)

[2 POINTS] Which of the following properties of a variable is determined by a variable declaration?
   a) value
   b) type
   c) name
   d) a and b
   e) a and c
   f) b and c
   g) none of the above

[2 POINTS] Which of the following properties of a variable is determined by an assignment statement?
   a) value
   b) type
   c) name
   d) a and b
   e) a and c
   f) b and c
   g) none of the above

[1 POINT] What is the value of a ‘new’ expression, such as new example1.Terrarium()?
   a) a reference
   b) an instance
   c) a variable
   d) an object

[1 POINT] What elements must every variable declaration contain?
   a) name and value
   b) type and value
   c) type and name
   d) object and reference
   e) header and body
Question 3 [9 points]

The code sample given below is correct: it compiles without errors. Assume that the classes it references (e.g. Device, Screen) are defined; the definition of Device is given in Question 1.

Answer the questions below.

```java
package exam1;

public class Factory {
    public Factory() {
        control.Device x;
        x = new control.Device();
        component.Screen y;
        y = new component.Screen();
    }
}
```

a) How many variables are declared in the code shown above? [1 point]

Two variables are declared.

For questions (b) through (e) assume that the expression `new exam1.Factory()` is evaluated. **Remember to consider the definition of control.Device given in question 1.** You may assume that the classes Screen and Image do not create any additional objects when instantiated.

b) How many exam1.Factory objects are created? [2 points]

1

c) How many control.Device objects are created? [2 points]

1

d) How many control.Screen objects are created? [2 points]

2

e) How many objects in total are created? [2 points]

5
Question 4 [9 points]

Write a variable declaration for a variable of type exam1.Color
Use your favorite color as the name of the variable, making sure to use only lowercase letters.
[3 points]

```java
exam1.Color blue;
```

Assume now that the variable described above has been correctly declared. Assign to it a reference to a newly created exam1.Color object.
[3 points]

```java
blue = new exam1.Color();
```

Assume now that the variable described above has been correctly declared and has been assigned a reference to a newly created exam1.Color object. Assume that there is a method named mix, taking no arguments, defined for this object. Using the variable you declared, call the mix method on the exam1.Color object whose reference is stored in it.
[3 points]

```java
blue.mix();
```
Question 5 [9 points]

Complete each of the following sentences. Choose the best answer for each sentence from the phrases given below. You may use each phrase at most once; not all phrases will be used.

- A class definition consists of a/the ________ (g) ________ and a/the ________ (j) ________.

- A variable declaration determines a/the ________ (k) ________ and a name for a variable.

- When carrying out an assignment statement a/the ________ (d) ________ on the right of the a/the ________ (a) ________ operator is evaluated first, and the resulting value is stored in a/the ________ (e) ________ on the left.

- A compiler translates a program from a/the ________ (c) ________ level language to a/the ________ (l) ________ level language.

- The ‘new’ operator allocates ________ (m) ________ to hold the representation of an object.

PHRASES:

a) assignment  
 b) stack  
 c) high  
 d) expression  
 e) variable  
 f) heap  
 g) class header  
 h) private  
 i) access control modifier  
 j) class body  
 k) type  
 l) low  
 m) memory  
 n) name  
 o) value  
 p) object  
 q) class  
 r) method
Question 6 [4 points]

As part of your lab work you read some information about the first programmers of the ENIAC. Who were the first programmers? You can but need not list their names, but describe them and their backgrounds. How well were their accomplishments recognized at the time? Explain.

The first programmers were six women who had previously worked as ‘computers’ (people who computed). They had mathematical training. Their accomplishments were not well recognized at the time due to their gender.