Name:

1.124 Quiz 2

Thursday November 9, 2000

Time: 1 hour 20 minutes
Answer all questions. All questions carry equal marks.

Question 1.

Show the steps that are involved in sorting the string *SORTME* using the quicksort algorithm given below.

```
#include <iostream.h>
void quicksort(char *a, int l, int r);

main() {
   char str[8] = "9SORTME";        // 9 is a sentinel.
   quicksort(str, 1, 6);
}

inline void swap(char *a, int i, int j) {
   char tmp = a[i];
   a[i] = a[j];
   a[j] = tmp;
   cout << a+1 << endl;               // Print out the array, excluding the sentinel.
}

void quicksort(char *a, int l, int r) {
   if (r > l) {
      char v = a[r];
      int i = l - 1;
      int j = r;
      while (1) {
         while(a[++i] < v);
         while(a[--j] > v);
         if (j <= i)
            break;
         swap(a, i, j);
      }
      swap(a, r, i);

      quicksort(a, l, i-1);
      quicksort(a, i+1, r);
   }
}
```

Answer:

S	O	R	T	M	E

Question 2.
Show how you would translate the bold portions of the following C++ code into Java.

```cpp
#include <iostream.h>

class Shape {
private:
  float x, y;

public:
  Shape(float a, float b) {
    x = a;
    y = b;
  }

  virtual float compute_area() = 0;

  virtual void print() {
    cout << x << " " << y << endl;
  }
};

class Circle : public Shape {
private:
  float radius;

public:
  Circle(float a, float b, float r) : Shape(a, b) {
    radius = r;
  }

  float compute_area() {
    return 3.14f * radius * radius;
  }

  void print() {
    cout << radius << endl;
    Shape::print();
  }
};

void main() {
  Circle a(3,4,2);
  a.print();
}
```

Answer:

Question 3.
In the following C++ program, the *outputData()* function can handle callbacks such as *plot()* and *print()*. How would you complete the given Java code to implement a similar capability?

```
#include <iostream.h>

class Point {
private:
   int x, y;

public:
   Point(int a = 0, int b = 0) {
      x = a;
      y = b;
   }

   void print() {
      cout << x << " " << y << endl;
   }
};

typedef void (*OutFunc)(Point& p);

void plot(Point &p) {                          // Assume that this plots the point p on the screen.
   cout << "In plot:" << endl;
   p.print();
}

void print(Point &p) {                         // Assume that this prints out the coordinates of p.
   cout << "In print:" << endl;
   p.print();
}

void outputData(OutFunc pFunc, Point *a, int n) {
   for (int i = 0; i < n; i++)
      pFunc(a[i]);
}

void main() {
   Point a[2];
   a[0] = Point(2,3);
   a[1] = Point(4,5);
   outputData(plot, a, 2);
   outputData(print, a, 2);
}
```

Answer:

```
class Point {
   private int x, y;

   public Point(int a, int b) {
      x = a;
      y = b;
   }

   void print() {
      System.out.println(x + " " + y);
   }
}




class Plotter
{




}

class Printer
{




}

class Main {
   static void outputData(                              ) {



   }

   public static void main(String args[]) {
      Point a[] = new Point[2];
      a[0] = new Point(2,3);
      a[1] = new Point(4,5);

      outputData(new Plotter(), a, 2);
      outputData(new Printer(), a, 2);
   }
}
```

Question 4.

Show how you would complete the given Java code, so that it achieves the effect shown in the Figure below.
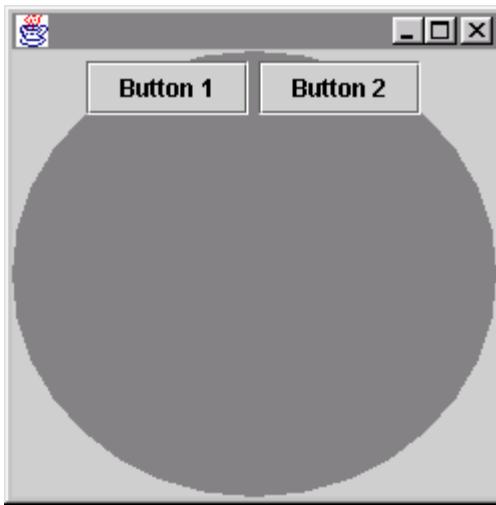

Answer:

```java
import java.awt.*;
import javax.swing.*;

class Main {
 public static void main(String args[]) {
   JFrame f = new JFrame();
```

```java
   f.setSize(250,250);
   f.setVisible(true);
  }
}
```

Question 5.

How you would you change the background color of the panel when the mouse moves over the application's window?
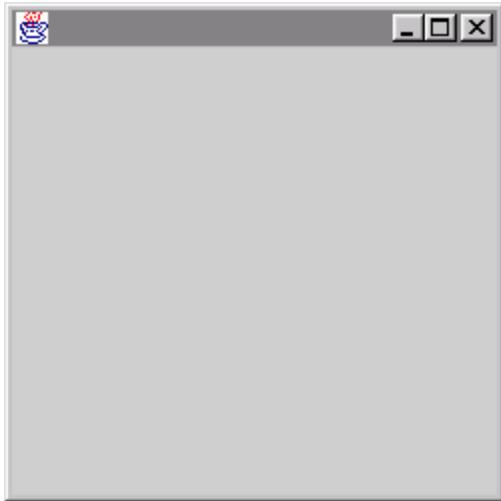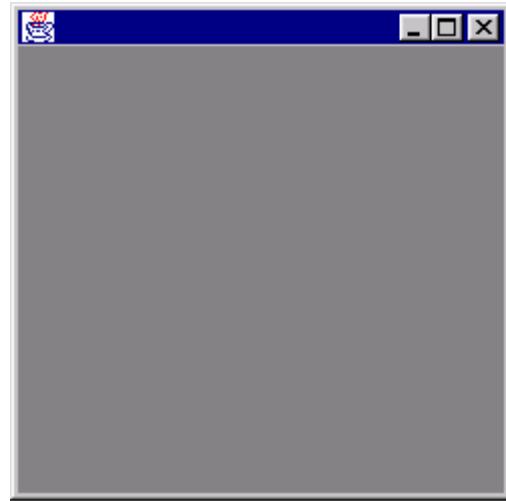
Mouse out   Mouse over

import java.awt.*;
import java.awt.event.*;
import javax.swing.*;

class Main {
 public static void main(String args[]) {
   JFrame f = new JFrame();
   final JPanel p = new JPanel();

Answer:

   f.setContentPane(p);
   f.setSize(250,250);
   f.setVisible(true);
  }
}

Question 6.
The following applet contains several errors. Explain what changes you would make to correct the code, so that the applet displays the current frame number.

Answer:

```
/*
  <APPLET CODE=MyApplet.class WIDTH=250 HEIGHT=100>
  </APPLET>
*/

import java.awt.*;
import javax.swing.*;

public class MyApplet extends JApplet
{
   Thread t = null;
   int count = 0;

   public void init() {
      getContentPane().add(new JPanel() {
          public void paintComponent(Graphics g) {
              super.paintComponent(g);
              g.drawString("Count = " + count, 50, 50);
          }
       });
   }

   public void start() {
      t = new Thread();
      t.start();
   }

   public void run() {
      for (int i = 0; i < 200; i++) {
         count++;
         repaint();
         Thread.sleep(100);
      }
   }
}
```

Question 7.

What is double buffering and why is it important in animation? How do the Swing classes differ from the AWT classes in this respect?

> **Answer:**

Question 8.

Show how you would extract the number *1.124* from the string *"Hello 1.124 World!"* and then store it in a *float* variable.

> **Answer:**