Print Your Name_____

You may use one page of hand written notes (both sides) and a dictionary. No i-phones, calculators or any other type of non-organic computer. Do not take this exam if you are sick. Once you start the exam, you may not leave the room until you turn it in. After turning in the exam, you may not continue work on it. Write answers on exam. You may use extra paper which you may turn in or keep, as you see fit.

1) This Java program compiles and runs. What is the output?

```
 1) public class ArrayRangeScaleAndShift
 2) {
 3)   public static void main(String[] args)
 4)   {
 5)     int[] x = {0, -50, 150, 100, 20, -10, -20};
 6)     int min  = -50;
 7)     int max  = 150;
 8)     int max2 = 10;
 9)
10)     for (int i=0; i<x.length; i++)
11)     {
12)       System.out.println(
13)         "x[" + i + "] = " + x[i]+ " --> " +
14)         ((x[i]-min) * max2)/(max-min));
15)     }
16)   }
17) }
```

2) This Java program compiles and runs. What is the output?

```
 1) public class NumberFun
 2) {
 3)  private static int getSum(int a)
 4)    {
 5)      int b = 0;
 6)      while (a > 0)
 7)      {
 8)        b += a % 10;
 9)        a /= 10;
10)      }
11)      return b;
12)    }
13)
14)    public static void main(String[] args)
15)    {
16)      System.out.println(getSum(52));
17)      System.out.println(getSum(2637));
18)    }
19)  }
```

3) This Java program compiles and runs. What is the output?

```
 1) public class Histogram
 2) {
 3)   public static void main(String[] args)
 4)   {
 5)     int[] histogram = new int[10];
 6)     for (int a = 1; a < 5; a++)
 7)     {
 8)       for (int b = 1; b < 5; b++)
 9)       {
10)         histogram[a + b]++;
11)       }
12)     }
13)     for (int i = 0; i < histogram.length; i++)
14)     {
15)       System.out.print(histogram[i]+" ");
16)     }
17)   }
18) }
```

4) This Java program compiles and runs. What is the output?

```
1)  public class LoopWithModulus
2)  {
3)    public static void main(String[] args)
4)    {
5)       int n = 700;
6)       int z = 2;
7)       while (n > 1)
8)       {
9)         if ((n % z) == 0)
10)        {
11)          System.out.print(z + " ");
12)          n = n / z;
13)        }
14)        else z++;
15)      }
16)    }
17) }
```

5) This Java program compiles and runs. What is the output?

```
 1) public class LoopWithString
 2) {
 3)   public static void main(String[] args)
 4)   {
 5)     String foo = "Game765of432xxx55";
 6)     int n = -1;
 7)     char c = 'x';
 8)
 9)     while (!Character.isDigit(c))
10)     { System.out.println("n="+ n + "*");
11)       n++;
12)       c = foo.charAt(n);
13)     }
14)
15)     while (Character.isDigit(c))
16)     { System.out.println("n="+ n + ", c=" + c );
17)       n++;
18)       if (n >= foo.length()) break;
19)       c = foo.charAt(n);
20)     }
21)   }
22) }
```

6) This Java program compiles and runs. What is the output?

```
 1) public class LoopNest
 2) {
 3)   public static void main(String[] args)
 4)   {
 5)     for (int i=0; i<20; i=i+5)
 6)     {
 7)       for (int k=i; k<=i*2; k=k+10)
 8)       {
 9)         System.out.print(" " + k);
10)       }
11)       System.out.println("<===== i=" + i);
12)     }
13)   }
14) }
```

7) This Java program compiles and runs. What is the output?

```
 1)  public class MethodPower
 2)  {
 3)    public static int foo(int a)
 4)    {
 5)      int b = a / 10;
 6)      int c = a % 10;
 7)      System.out.println("a="+ a + ", b="+ b + ", c=" + c);
 8)      for (int i=b; i<=c; i++)
 9)      { System.out.println(i + " ");
10)        if (b == c) return i;
11)      }
12)      return c;
13)    }
14)
15)
16)    public static void main(String[] args)
17)    {
18)      int a=25, b=52, c=44;
19)      System.out.println("foo=" + foo(a));
20)      System.out.println("foo=" + foo(b));
21)      System.out.println("foo=" + foo(c));
22)    }
23)  }
```

8) This Java program compiles and runs. Assume the CS-152 Picture class is in the same directory as this class. What is the output?

```
1)  import java.awt.Graphics;
2)  import java.awt.Color;
3)
4)  public class WonderDraw
5)  {
6)    public static void main(String[] args)
7)    {
8)      Picture bob = new Picture(401, 401);
9)      Graphics canvas = bob.getOffScreenGraphics();
10)     canvas.setColor(Color.RED);
11)     int a = 0;
12)     for (int x=0; x<=400; x=x+40)
13)     {
14)        //drawLine(x1, y1, x2, y2)
15)        if (x == 200) a = 400;
16)        canvas.drawLine(200, x, x, 200);
17)     }
18)     bob.repaint();
19)   }
20) }
```

9) This Java program compiles and runs. What is the output?

```
 1)  import java.awt.Graphics;
 2)  import java.awt.Color;
 3)
 4)  public class WonderDraw
 5)  {
 6)    public static void main(String[] args)
 7)    {
 8)      Picture bob = new Picture(301, 301);
 9)      Graphics canvas = bob.getOffScreenGraphics();
10)      canvas.setColor(Color.RED);
11)      for (int a=30; a<300; a=a+30)
12)      {
13)         //drawLine(x1, y1, x2, y2)
14)         canvas.drawLine(a, a-10, a, a+10);
15)         canvas.drawLine(a, a, a+10, a+10);
16)         canvas.drawLine(a, a, a-10, a+10);
17)      }
18)      bob.repaint();
19)    }
20)  }
```

10) This Java program compiles and runs. What is the output?

```
 1)  import java.awt.Graphics;
 2)  import java.awt.Color;
 3)
 4)  public class WonderDraw
 5)  {
 6)    public static void main(String[] args)
 7)    {
 8)      Picture bob = new Picture(401, 401);
 9)      Graphics canvas = bob.getOffScreenGraphics();
10)      canvas.setColor(Color.GREEN);
11)
12)      for (int col = 0; col<4; col++)
13)      {
14)        for (int row = 0; row<4; row++)
15)        {
16)          if ((row % 2) == (col % 2))
17)          {
18)            int x = col*100;
19)            int y = row*100;
20)            canvas.fillRect(x, y, 95, 95);
21)          }
22)        }
23)      }
24)      bob.repaint();
25)    }
26)  }
```