Please answer FIVE OF THE SIX questions, in the spaces provided. On this score sheet, clearly indicate which questions you are answering by circling the numbers of the questions you are choosing to answer and crossing out the one left out. Only five questions will be graded. If you make a mistake or for some other reason need more space, please use the back of pages and clearly indicate where the answer can be found.
1. [ /20]
   a) What gets printed by the following program?

   // Guess what this does
   public class Midterm
   {
     public static void main(String args[])
     {
       int x = 10;
       int a = 20;
       int b = 30;
       x = a;
       a = b;
       b = 40;

       String mood = "happy";

       System.out.println(" Welcome to the \n1051 Test \"experience\" ");
       System.out.println(" x = " + x + " a = " + a + " b = " + b);

       System.out.print(" and this: " + (2 + 3));
       System.out.print(" Try this: " + 2 + 3);
       System.out.println(" and this also: " + "2 + 3");

       System.out.println(" This is a " + mood + " " + mood + " day!");
     }
   }

   *Output*

   b) Write a single println statement that would output:

   Hi
   "there"
2. [20] Short answer questions.

- For each of the following expressions, indicate the order in which the operations are performed by writing a number beneath each operator.

  a / b - d * e + f

  a / (b + c) / e - f

- Consider the following code fragment:

  ```java
  if (a>0)
    if (b<0)
      x = x + 5;
    else
      if (a>5)
        x = x + 4;
      else
        x = x + 3;
    else
      x = x + 2;
  ```

  If x is currently 0, a = 5 and b = 5, what will x become after the above statement is executed?

  \[ x = \underline{\underline{\phantom{0}0}} \]

- The code below is supposed to print the numbers from 1 to 10, but it has an error.

  ```java
  int count = 1;
  while (count <= 10);
  {
    System.out.println (count);
    count++;  
  }
  ```

  a) Describe the error and how to correct it?

  b) If the error is not corrected, what, if anything gets printed?

  c) Is this a syntax, runtime, or logical error?
3. [ 20]
What gets printed? Please show output as it will appear or indicate “NO OUTPUT”.
If it’s an infinite loop, be sure to show some of the output followed by “INFINITE LOOP.”

```java
int a = 4;
while (a < 8)
{
    a++;
    System.out.println(a);
}
```

Output:
```
4
5
6
7
```

```java
int a = 4;
while (a < 8)
{
    System.out.println(a);
    a--;
}
```

Output:
```
4
3
2
```

```java
int a = 4;
while (a <= 5)
{
    System.out.println(2*a);
    a++;
}
```

Output:
```
8
10
12
```

```java
int a = 4;
while (a < 14)
{
    System.out.println (a);
    a = a + 3;
}
```

Output:
Let's look at the problem of repeatedly obtaining input and performing a calculation, for example, computing the circumference of a circle given its radius, using the following algorithm:

Variables:
- radius, circ

Algorithm:
- input radius
  - circ = 2 * radius * PI
  - print circ

Rewrite this algorithm, modifying it so that it uses a while structure to repeat the processing of each input in two different ways.

a) Keep computing circumferences and ask each time whether to keep going.

Variables:

Algorithm:

b) Compute the circumferences of 10 circles (exact count).

Variables:

Algorithm:
Construct an algorithm that inputs 10 positive numbers and prints the maximum of these numbers.

**Example:** If the numbers input are 44 7 31 22 53 16 21 48 72 60, the output should be: max = 72

**Directions:**
Write your algorithm by rearranging and structuring elements chosen from the list below, using indentation to show structure. Do not use anything else and note that not all of these are needed, but you may use one of them more than once, if necessary.

```plaintext
num = 0
count = 0
max = 0
count = count + 1
num = max
max = num
print "max = " max
input num
```

```plaintext
input max
input count
if (num > max)
if (count < max)
else
while (count <= 10)
while (count < 10)
while (num < max)
while (num != max)
```
6. [_____/ 20] Finish writing the Java code below that asks the user to input an integer representing a number of days and then calculates and prints the equivalent as a number of weeks and days. For example, if the user inputs 18 for the number of days, the output should state that it is equivalent to 2 weeks and 4 days.

You are NOT required to write comments on this code.

```java
import java.util.Scanner;

public class Days {
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
        // Your code here
    }
}
```
Please answer FIVE OF THE SIX questions, in the spaces provided.
On this score sheet, clearly indicate which questions you are answering by circling the numbers of the questions you are choosing to answer and crossing out the one left out.
Only five questions will be graded. If you make a mistake or for some other reason need more space, please use the back of pages and clearly indicate where the answer can be found.
1. [40] 
   a) What gets printed by the following program?

   // Guess what this does
   public class Midterm
   {
       public static void main(String args[])
       {
           int x = 1;
           int a = 2;
           int b = 3;
           x = a;
           a = b;
           b = 4;

           String mood = "happy";

           System.out.println(" Welcome to the \nTest 1 \"experience\" ");
           System.out.println(" x = " + x + " a = " + a + " b = " + b);

           System.out.println(" Try this: " + 2 + 3);
           System.out.println(" and this: " + (2 + 3));
           System.out.println(" and this also: " + "2 + 3");

           System.out.println(" This is a " + mood + " " + mood + " day!");
       }
   }

   Output

   b) Write a single println statement that would output:

   "Hello" there
2. [20] Short answer questions.

- For each of the following expressions, indicate the order in which the operations are performed by writing a number beneath each operator.

\[ a - b + d / e / f \]

\[ b + e + a + f + c \]

- Consider the following code fragment:

```java
if (a>0)
    if (b<0)
        x = x + 5;
    else
        if (a>5)
            x = x + 4;
        else
            x = x + 3;
    else
        x = x + 2;
```

If x is currently 0, a = 1 and b = -1, what will x become after the above statement is executed?

\[ x = \underline{\text{ }} \]

- For each of the following Java code fragments, mark the error and show how to correct it. What do you need to do to fix it so that it works as appears to be intended?

a) ```java
if (value = 0)
    System.out.print ("Right!");
```

b) ```java
if (value > 0);
    System.out.print ("Right!");
```

c) ```java
if (value > 0)
    System.out.print ("Right!");
    System.out.println(“ value is positive”);
```
3. [         /20]
What gets printed? Please show output as it will appear or indicate “NO OUTPUT”.  
If it’s an infinite loop, be sure to show some of the output followed by “INFINITE LOOP.”

```java
int a = 4;
while (a > 0)
{
    System.out.println(a);
    a++;
}
```

Output:

```java
int a = 4;
while (a > 0)
{
    System.out.println(a);
    a = a - 2;
}
```

Output:

```java
int a = 1;
while (a < 4)
{
    a++;
    System.out.println(a);
}
```

Output:

```java
int a = 4;
while (a < 4)
{
    System.out.println(a);
    a++;
}
```

Output:
4. [20] Let’s look at the problem of repeatedly obtaining input and performing a calculation, for example, computing the area of a circle given its radius, using the following algorithm:

| Variables: |
| radius, area |

| Algorithm: |
| input radius |
| area = radius*radius*PI |
| print area |

Rewrite this algorithm, modifying it so that it uses a while structure to repeat the processing of each input in two different ways.

a) Compute the areas of 5 circles (exact count).

| Variables: |

| Algorithm: |

b) Keep computing circle areas until user inputs -1 for the radius (sentinel value)

| Variables: |

| Algorithm: |
5. [_____/ 20]
Construct an algorithm that inputs a number num and then prints “Hello” that many times. After the “Hello”s are printed, print a goodbye message.

*Example:* If num (i.e., the input) is 5, the algorithm should print something like this:
```
Hello
Hello
Hello
Hello
Hello
Goodbye
```

*Directions:*
Write your algorithm by rearranging and structuring elements chosen from the list below, using indentation to show structure. Do not use anything else and note that not all of these are needed, but you may use one of them more than once, if necessary.

```
input num
input count
count = 1
count = 0
count = count + 1
num = num + 1
if (count < num)
else
while (count <= num)
while (count != 5)
while (count <= 5)
print "Hello"
print num
print "Goodbye"
```
6. [_____/ 20] Finish writing the Java code below that asks the user to input a value representing a number of seconds, and then prints the equivalent amount of time as a combination of hours, minutes, and seconds. (For example, 9999 seconds is equivalent to 2 hours, 46 minutes and 39 seconds.)

Be sure to write a complete Java program, including class definition, variable and constant declarations, as appropriate, comments, and proper indentation, to make it readable.

```java
import java.util.Scanner;

public class Seconds {
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);
```