**Computer Engineering Department**
**Bilkent University**

**CS101**
**Practice Midterm Exam**
**March 25, 2002**                                                                          **NAME:**

**GOOD LUCK!**

**Notes:**    **1. There are 9 questions on 6 pages.**
          **2.  Please READ the questions.  Note that actual exam questions may be easier or harder**
             **than these questions.**
          **3. 100 points (pts.)  possible.  It is a closed book exam.**
          **4. Provide simple, short, understandable answers.**
          **5. You have 90 minutes.**

**1.**    (9 pts.)  Consider the following questions on numbers systems and character representation.

**a.**    What is the octal (base 8) equivalent of  95?  Show your work.

**b**.    What is the hexadecimal equivalent of the following binary number?
          1000100011.11101

**c.**    In Unicode representation character A is represented by the hexadecimal number 0041, and character a
          is represented by the hexadecimal number 0061.  Give the Unicode representation of the word
          "Bilkent" in the following table (i.e., give the hexadecimal Unicode representation for each character).

| Character | B | i | l | k | e | n | t |
|---|---|---|---|---|---|---|---|
| Unicode hex represent. | | | | | | | |

**d.**    .Perform the addition of the following binary numbers.

```
    1 1 0 1 1 0 1 1
 + 1 1 0 1 1 1 1 1
 ----------------------------
```

**2**.    (9 pts.) What values will be displayed after the execution of the following statements?  All variables are
          of type int.

**a**.  
```
for (sum= 0, i= 0; i < 6; i++)
     sum +=i;
System.out.println(sum);
```

**b**.  
```
k= 2;
i= k * 1 / 2;
switch (i) {
     case 1: k= 0;
     case 2: k= 1;
     default: k= 2;
}
System.out.println (k);
```

**c**.  
```
a= 1; b= 2; c= 5; d= 4; e= 1;
if (a < b || c == d && e < 5)
     i= 1;
else
     i= 0;
System.out.println(i);
```

**3.** (6 pts.) Draw the flowchart of the following code segment.

```
for (i= 0, k=0; k < n; k++)
     if(k%n != 0) k++;
```

**4.**   (14 pts.) Consider the following series.

$$1, 5, 9, 13, 17, 21, \ldots$$

**a.**   As it is shown above the first element of the series is 1, the second element of the series is 5, and so on. What are the next five numbers that follow 21 in the above series?

**b.**   Consider the method. findSum(int n), that finds the summation of the elements of the above series where the value of the last series element added to the sum cannot be greater than the method's only parameter n.

```
public static int findSum (int n)
{
    int ele= ...;
    int sum= ...;
    while (          ...          ) {
            System.out.println(ele);
            sum=   ...   ;
            ele=   ...   ;
    }
    return   ...   ;
}
```

**b.**   What values will be displayed if a properly written (i.e., correct) function is called in the following ways.

```
i=  findSum ( 8 );
 System.out.println(i);
```

```
i=  findSum ( 20 );
 System.out.println(i);
```

**5**. (9 pts.) Consider the following function f1( ).

```
int f1 (int x, int y, int z)                    Draw your flowchart below (first read section a below)
{
  int a;
  // Point 1
  if x < y
    a= x;
  else
    a= y;
  if z < a
    a= z;
  // Point 2
  return (a);
}
```

**a.**   Draw the flowchart for f1( ) from Point1 to Point2 (i.e., only for the if statements part of the function). For this purpose use the space available on the right hand side of the function.

**b.**   What values will be displayed by the following statements?

```
i= f1 (1, 7, 1);
System.out.println(i);
```

```
i= (30, 20, 10);
System.out.println(i);
```

```
i= f1 (6, 68, 25);
System.out.println(i);
```

**6.**   (10 pts.) Implement a method, findSum( ), to find the summation of integer numbers from 0 to n that are multiple of 4, where n is the only parameter of the function.  Your implementation must be complete, i.e., it must contain both the method header and the method body.  If n < 4, the method returns 0.
Hint  i = findSum (10);
        System.out.println(i);  //  displays 12

**7.**   (20 pts.) In the following statements please fill in the missing parts, shown by, ……………….. Note that 2 points/statement.

**a**.   During compilation time we usually correct ………………… errors.

**b**.   A compiler translates the source program written by the programmer into a …………..……. program.

**c**.   Another name for the register Program Counter is ………………………..

**d**.   During the execution of an instruction we have fetch, …………………….. , and execute (perform) instruction phases.

**e**.   In programming debugging means ……………………..

**f**.   The concept of abstraction considers the question "…………..…….", but it ignores the question "how".

**g.**   The following for statement
for (; ;);
generates a(n) …………..……. loop.

**h**.   The following code segment
x= 4;
while (x > 1)
     x--;
System.out.println(x);;
displays  …………..…….

**i.**   The function of the loader is to place the …………………….. program into the memory.

**j**.   while (false) {System.out.println( "Hello.");};; generates the Hello message  …………..……. times.

**8**.        (8 pts.)  Consider the following programs.

**a**.        How many times will the following program print "Hello"?

```
x = 3;
y = 10;
while (x < y)
  { System.out.println("Hello");
    x = x + 1;
    y = y - 1;
  }
```

**b**.        Assume that the first input is 3, and the second input is 4.  Generate the code segment output.

```
System.out.println("enter first the integer");
int y = Keyboard.readInt();
System.out.println("enter second the integer");
int x = Keyboard.readInt();
for(int i = 1; i <= y; ++i){
        for(int j = 1; j <= x; ++j)
                System.out.print("#");
System.out.println();
```

**9**.  (15 pts.)  Write a main( ) method that would find the decimal equivalent of a binary number which is entered by using an int variable.  The user also enters the number of bits (noOfBits) of the input binary number (inputBinNo).  For example for inputBinNo= 1100 and noOfBits= 4, the program produces 12.