Architetture degli Elaboratori II I Test - 15/5/2003

First Name, Name :

Each exercise reports its value in marks: total marks 33/30.

1. (marks: 6)

Describe in details the meaning and the operation of the bit JMPC in the microinstruction MIC-1. Write two different microinstructions in MAL, with the corresponding binary code, that illustrate the most relevant uses of the bit JMPC.

2. (marks: 11)

Two local integer variables are denoted with A and B. You must perform the sum of the integers included between A and B (extremes of the interval included) and deposit the sum on the stack.

- (a) Perform the above sum as an IJVM method.
- (b) Write the part of the program that invokes the method of the previous point with A=10 and B=3.
- (c) Derive the binary (or exadecimal) coding for each IJVM instruction.
- (d) Assuming that the MIC-1 machine has a clock at 500 MHz, illustrate how you can evaluate the time that the machine spends to run you method.
- 3. (marks 8)

You have the following excerpt of an IJVM method that you know is located starting at the byte with address C0 of the method area of the memory. You must:

- (a) Draw the activation frame of the method;
- (b) report exactly the binary content of the method area of the memory starting from the byte with address CO.

```
.method crti (a)
.var
cont
anew
espo
.end-var
llb: istore cont
iload a
iflt llb
.....
```

4. (marks: 8)

In the IJVM language the instruction (iinc varnum const) contains two 8 bits operands (varnum, const). You want to extend the power of the language by introducing a variant of the iinc instruction that uses two 16 bits operands. To do this extension you can follow two alternatives:

- (a) Define a new IJVM instruction with a new operating code, like (iinc2 var2 const2), wherevar2 and cosnt2 are two 16 bits operands.
- (b) Use the prefix wide that applied to (iinc varnum const) causes the machine to read two 16 bits operands.

Describe the structure of the new instruction in the method area in the two alternatives and provide the micro-interpreter MIC-1 in the two cases.