Self-Check for Lecture#17

Solutions

1. Suppose that a program's data and executable code require 2048 bytes of memory. A new section of code must be added; it will be used with various values 30 times during the execution of a program. When implemented as a macro, the macro code requires 48 bytes of memory. When implemented as a procedure, the procedure code requires 128 bytes (including parameter-passing, etc.), and each procedure call requires 5 bytes.

How many bytes of memory will the entire program require if the new code is added as a macro?

3488 Bytes

How many bytes of memory will the entire program require if the new code is added as a procedure?

2326 Bytes

2. A) Write a MASM macro that calculates $x^2 - 1$ for its parameter $x$, and stores the result in memory at the second parameter. The caller passes $x$ by value, and the result variable by address.

```asm
PlusMinus MACRO x, addr
    push eax
    push ebx ; save registers
    push edi
    mov eax, x
    mov ebx, eax
    mul ebx ; $x \cdot x$ in eax
    dec eax ; $x \cdot x - 1$ in eax
    mov edi,addr
    mov [edi],eax ; save eax in memory address (edi)
    pop edi
    pop ebx ; restore registers
    pop eax
ENDM
```

B) Invoke the macro of part A) with 68 and memory location result.

```c
PlusMinus 68,OFFSET result
```
3. The code below uses the Space macro which simply displays the number of blank spaces specified by its argument. What output is generated by this MASM "program"?

```plaintext
main  PROC
    push 3
    push 7
    call rcrsn
    exit
main  ENDP

rcrsn  PROC
    push ebp
    mov ebp,esp
    mov eax,[ebp + 12]
    mov ebx,[ebp+8]
    cmp eax,ebx
    jl  recurse
    jmp quit
reccurse:
    inc eax
    push eax
    push ebx
    call rcrsn
    mov eax,[ebp + 12]
    call WriteDec
    Space 2
quit:
    pop ebp
    ret 8
rcrsn  ENDP
```

6 _ _ 5 _ _ 4 _ _ 3 _ _

Note that no output is produced until the recursion starts to “unwind”.