



1. Given the following array write a recursive procedure to replace each of the array element with its mathematical cube. [4 Points]

cubes WORD 1,2,3,4,5,6,7,8,9,10

2. Given that following code is some snippet from an encryption algorithm, where ax = 09h, dx = 70h, and cx = 4. Write the encrypted value in AX, and correct decryption code for the following snippet. [4 Points]

```
not    ax
rol    dl, cl
rcl    al, cx
xor    cx, 2
ror    al, cx
stc
rcl    al, 5
xchg   al, ah
add    al, 7
add    al, dl
```

3. Write the equivalent assembly code for following procedure and draw out the stack frame. Do not use ENTER/LEAVE, USES, and LOCAL directives. (Assume ESP = C101 0144h, and EBP = 0000 1000h, initially). [4 Points]

```
void main()
{
    char x[3]= {2,3,4};
    squares(x);
}
```

```
void squares (char arr[])
{
    for ( int i=0; i<3; i++)
        arr[i] = arr[i] * arr[i];
}
```

```
main  proc
      push  ebp
      mov   ebp,esp
      sub   esp, 6

      mov   [ebp-4], 2
      mov   [ebp-5], 5
      mov   [ebp-6], 6
      INVOKE squares, offset [ebp-4]

      add   esp, 4      ;cleaning passed arguments
      mov   esp, ebp    ;cleaning local data
      pop   ebp
      ret

main  endp
```

```
squares PROC, p:ptr byte
      push  ebp
      mov   ebp,esp
      mov   esi, p      ;pointer to x[]
      mov   cx, 3

      L1:   mov   ax,0
            mov   al, [esi]
            mul   al
            mov   [esi], al
            sub   esi, 1
      loop  L1

      pop   ebp
      ret

squares ENDP
```

C101 0140	Ret address(system)	MAIN'S STACK FRAME
C101 013C	0000 1000 (ebp)	
C101 0138	2	
C101 0137	5	
C101 0136	6	
C101 0135	C101 0138 (Argument)	SQUARES' STACK FRAME
C101 0131	Ret address(main)	
C101 012D	C101 013C (ebp)	

