

P1:

```

MODEL SMALL
STACK 20
DATA
ORG 1000H
NUM DB 25H, 35H, 45H, 32H, 56H, 98H, 76H, 76H
SUM DW ?
COUNT DW 0008H
CODE
START:
MOV AX, @DATA
MOV DS, AX
MOV CX, COUNT
MOV SI, 0000H
MOV AX, 0000H
REPEAT:
ADD AL, NUMESI
JNC NEXT
ADD AH, 01
NEXT:
INC SI
LOOP REPEAT
MOV SUM, AX
INT 3
END START

```

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[] CPU 80486 1=[↑][↓]

cs:0000 B8AF48	mov	ax, 48AF	ax 02AB	c=0
cs:0003 8ED8	mov	ds, ax	bx 0000	z=0
cs:0005 8B0E0A10	mov	cx, [100A]	cx 0000	s=0
cs:0009 BE0000	mov	si, 0000	dx 0000	o=0
cs:000C B80000	mov	ax, 0000	si 0008	p=0
cs:000F 02840010	add	al, [si+1000]	di 0000	a=0
cs:0013 7303	jnb	0018	bp 0000	i=1
cs:0015 80C401	add	ah, 01	sp 0014	d=0
cs:0018 46	inc	si	ds 48AF	
cs:0019 E2F4	loop	000F	es 489D	
cs:001B A30810	mov	[1008], ax	ss 49B0	
cs:001E CC	int	03	cs 48AD	
cs:001F 0000	add	[bx+si], al	ip 001E	

ds:1000	25	35	45	32	56	98	76	76	»5E2Ujw
ds:1008	AB	02	08	00	00	00	00	00	½0
ds:1010	02	02	00	00	00	00	AF	48	»H
ds:1018	D6	01	C5	15	AB	02	1E	00	½3

ss:0016 0000
ss:0014 0000

Output Lowe Byte

Output Higher Byte

P2:

```

MODEL SMALL
STACK 10
DATA
ORG 1200H
ARRAY DB 25H, 35H, 45H, 31H, 56H, 25H, 76H, 76H, 28H, 56H, 05H, 35H,
25H, 00H, 98H, 21H
ORG 1220H
RES DB ?
COUNT DW 0010H
CODE
START:
MOV AX, @DATA
MOV DS, AX
MOV CX, COUNT
MOV SI, 0000H
MOV AL, 25H
REPEAT:
CMP AL, ARRAY[SI]
JNE NEXT
INC RES
NEXT:
INC SI
LOOP REPEAT
INT 3
END START

```

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[CPU 80486] 1-[] []

cs:0000 B8AE48	mov	ax,48AE	ax 4825	c=0
cs:0003 8ED8	mov	ds,ax	bx 0000	z=0
cs:0005 8B0E2D12	mov	cx,[122D]	cx 0000	s=0
cs:0009 BE0000	mov	si,0000	dx 0000	o=0
cs:000C B025	mov	al,25	si 0010	p=0
cs:000E 3A840C12	cmp	al,[si+120C]	di 0000	a=1
cs:0012 7504	jne	0018	bp 0000	i=1
cs:0014 FE062C12	inc	byte ptr [122]	sp 0014	d=0
cs:0018 46	inc	si	ds 48AE	
cs:0019 E2F3	loop	000E	es 489D	
cs:001B CC	int	03	ss 49D1	
cs:001C 0000	add	[bx+si],al	cs 48AD	
cs:001E 0000	add	[bx+si],al	ip 001C	

ds:122C 03 10 00 00 02 48 00 00 00

ds:1234 00 00 AE 48 D6 01 C5 15

ds:123C 25 48 1B 00 AD 48 12 33

ds:1244 00 00 00 00 00 00 00 00

ss:0016 0000

ss:0014 0000

Output

P3:

```

MODEL SMALL
STACK 20
DATA
ORG 1200H
ARRAY1 DB 05H, 15H, 25H, 35H, 45H, 55H, 65H, 75H, 85H, 95H
ORG 1220H
ARRAY2 DB 0A1H, 0A2H, 0A3H, 0A4H, 0A5H, 0A6H, 0A7H, 0A8H, 0A9H,
0AAH
COUNT DW 000AH
CODE
START:
MOV AX, @DATA
MOV DS, AX
MOV CX, COUNT
MOV SI, 0000H
REPEAT:
MOV AL, ARRAY1[SI]
XCHG AL, ARRAY2[SI]
MOV ARRAY1[SI], AL
INC SI
LOOP REPEAT
INT 3
END START

```

Before:

Address	Instruction	AX	CX	DX	SI	DI	BP	SP	IP
cs:0000	B8AE48 mov ax,48AE	ax 48AE							c=0
cs:0003	BED8 mov ds,ax	bx 0000							z=0
cs:0005	BB0E3612 mov cx,[1236]	cx 0000							s=0
cs:0009	BE0000 mov si,0000	dx 0000							o=0
cs:000C	8A840C12 mov al,[si+120C]	si 0000							p=0
cs:0010	86842C12 xchg [si+122C],al	di 0000							a=0
cs:0014	88840C12 mov [si+120C],al	bp 0000							i=1
cs:0018	46 inc si	sp 0014							d=0
cs:0019	E2F1 loop 000C	ds 48AE							
cs:001B	CC int 03	es 489D							
cs:001C	0000 add [bx+sil],al	ss 49D2							
cs:001E	0000 add [bx+sil],al	cs 48AD							
cs:0020	0000 add [bx+sil],al	ip 0005							

Address	Instruction	AX	CX	DX	SI	DI	BP	SP	IP
cs:0000	B8AE48 mov ax,48AE	ax 48AE							c=0
cs:0003	BED8 mov ds,ax	bx 0000							z=0
cs:0005	BB0E3612 mov cx,[1236]	cx 0000							s=0
cs:0009	BE0000 mov si,0000	dx 0000							o=0
cs:000C	8A840C12 mov al,[si+120C]	si 0000							p=0
cs:0010	86842C12 xchg [si+122C],al	di 0000							a=0
cs:0014	88840C12 mov [si+120C],al	bp 0000							i=1
cs:0018	46 inc si	sp 0014							d=0
cs:0019	E2F1 loop 000C	ds 48AE							
cs:001B	CC int 03	es 489D							
cs:001C	0000 add [bx+sil],al	ss 49D2							
cs:001E	0000 add [bx+sil],al	cs 48AD							
cs:0020	0000 add [bx+sil],al	ip 0005							

After:

Address	Instruction	AX	CX	DX	SI	DI	BP	SP	IP
cs:0000	B8AE48 mov ax,48AE	ax 48AA							c=0
cs:0003	BED8 mov ds,ax	bx 0000							z=0
cs:0005	BB0E3612 mov cx,[1236]	cx 0000							s=0
cs:0009	BE0000 mov si,0000	dx 0000							o=0
cs:000C	8A840C12 mov al,[si+120C]	si 000A							p=1
cs:0010	86842C12 xchg [si+122C],al	di 0000							a=0
cs:0014	88840C12 mov [si+120C],al	bp 0000							i=1
cs:0018	46 inc si	sp 0014							d=0
cs:0019	E2F1 loop 000C	ds 48AE							
cs:001B	CC int 03	es 489D							
cs:001C	0000 add [bx+sil],al	ss 49D2							
cs:001E	0000 add [bx+sil],al	cs 48AD							
cs:0020	0000 add [bx+sil],al	ip 001B							

Address	Instruction	AX	CX	DX	SI	DI	BP	SP	IP
cs:0000	B8AE48 mov ax,48AE	ax 48AA							c=0
cs:0003	BED8 mov ds,ax	bx 0000							z=0
cs:0005	BB0E3612 mov cx,[1236]	cx 0000							s=0
cs:0009	BE0000 mov si,0000	dx 0000							o=0
cs:000C	8A840C12 mov al,[si+120C]	si 000A							p=1
cs:0010	86842C12 xchg [si+122C],al	di 0000							a=0
cs:0014	88840C12 mov [si+120C],al	bp 0000							i=1
cs:0018	46 inc si	sp 0014							d=0
cs:0019	E2F1 loop 000C	ds 48AE							
cs:001B	CC int 03	es 489D							
cs:001C	0000 add [bx+sil],al	ss 49D2							
cs:001E	0000 add [bx+sil],al	cs 48AD							
cs:0020	0000 add [bx+sil],al	ip 001B							

P4:

```

MODEL SMALL
STACK 20
DATA
NUM DB 11H, 21H, 31H, 31H, 55H, 45H, 35H, 25H
COUNT DW 0008H
CODE
START:
MOV AX, @DATA
MOV DS, AX
MOV CX, COUNT
DEC CX
NEXT:
MOV DX, CX
MOV SI, 0000H
REPEAT:
MOV AL, NUMESI
CMP AL, NUMESI + 1J
JC NOEX
XCHG AL, NUMESI + 1J
MOV NUMESI, AL
NOEX: INC SI
DEC DX
JNZ REPEAT
LOOP NEXT
INT 3
END START

```

Before sorting:

Address	Disassembly	Registers
cs:0000 80486	mov ax, 48AF	ax: 48AF, c: 0
cs:0003 8ED8	mov ds, ax	bx: 0000, z: 0
cs:0005 8B0E1000	mov cx, [0010]	cx: 0000, s: 0
cs:0009 49	dec cx	dx: 0000, o: 0
cs:000A 8BD1	mov dx, cx	si: 0000, p: 0
cs:000C BE0000	mov si, 0000	di: 0000, a: 0
cs:000F 8A840800	mov al, [si+0008]	bp: 0000, i: 1
cs:0013 3A840900	cmp al, [si+0009]	sp: 0014, d: 0
cs:0017 7208	jb 0021	ds: 48AF
cs:0019 86840900	xchg [si+0009], al	es: 489D
cs:001D 88840800	mov [si+0008], al	ss: 48B1
cs:0021 46	inc si	cs: 48AD
cs:0022 4A	dec dx	ip: 0005

After sorting:

Address	Disassembly	Registers
cs:000A 8BD1	mov dx, cx	ax: 4025, c: 0
cs:000C BE0000	mov si, 0000	bx: 0000, z: 0
cs:000F 8A840800	mov al, [si+0008]	cx: 0000, s: 1
cs:0013 3A840900	cmp al, [si+0009]	dx: 0000, o: 1
cs:0017 7208	jb 0021	si: 0001, p: 1
cs:0019 86840900	xchg [si+0009], al	di: 0000, a: 1
cs:001D 88840800	mov [si+0008], al	bp: 0000, i: 1
cs:0021 90	nop	sp: 0012, d: 0
cs:0022 4A	dec dx	ds: 48AF
cs:0023 75EA	jne 000F	es: 489D
cs:0025 E2E3	loop 000A	ss: 48B1
cs:0027 CC	int 03	cs: 48AD
cs:0028 253545	and ax, 4535	ip: FFB8