

Lab 2

1. Write an ALP to do addition of three floating point numbers using 8087 instruction set.

Test case data: $x = 3.5$ $y = 5.0$ $z = 2.2$

```
data segment
    a dd 5.0
    b dd 3.5
    c dd 2.2
    d dd ?
data ends

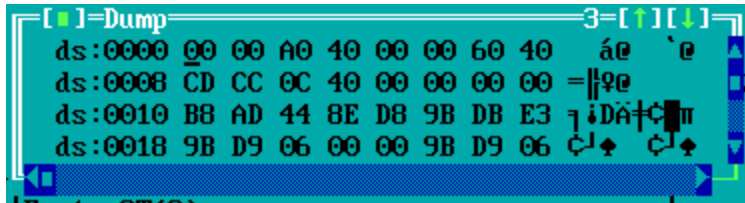
code segment
    assume cs:code, ds:data
    start:
    mov ax, data
    mov ds, ax

    finit
    fld a
    fld b
    fadd
    fld c
    fadd
    fst d
    int 3

code ends
end start
```

Output:

[EIP]=80486 IPTR=00000 OPCode=000 OPTR=00000 Z=[1][1]		
Valid ST(0) 10.700000047683716	im=1	ie=0
Empty ST(1)	dm=1	de=0
Empty ST(2)	zm=1	ze=0
Empty ST(3)	om=1	oe=0
Empty ST(4)	um=1	ue=0
Empty ST(5)	pm=1	pe=0
Empty ST(6)	iem=0	ir=0
Empty ST(7)	pc=3	cc=1
	rc=0	st=7
	ic=0	



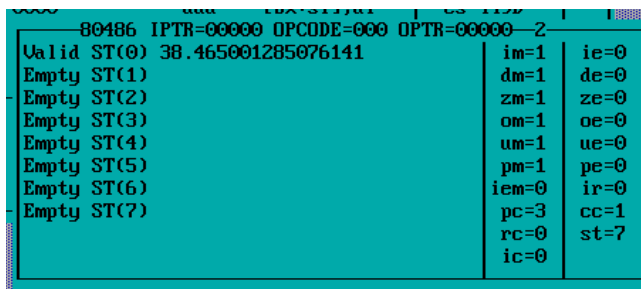
2. Write an ALP to find area of a circle using 8087 instruction set.
Test case data: Pi = 3.1472 radius = 3.5

```

1  data segment
2      pi dd 3.14
3      r dd 3.5
4      res dd ?
5  data ends
6  code segment
7      assume cs:code, ds:data
8      start:
9      mov ax, data
10     mov ds, ax
11     finit
12     fld pi
13     fld r
14     fld r
15     fmul
16     fmul
17     fst res
18     int 3
19 code ends
20 end start

```

Output:



```

[ ]=Dump 3=[ ]
ds:0000 C3 F5 48 40 00 00 60 40 JHe 'e
ds:0008 00 00 00 00 00 00 00 00
ds:0010 B8 AD 44 8E D8 9B DB E3 iDA-C
ds:0018 9B D9 06 00 00 9B D9 06 C- C-

```

3. Write an ALP to find volume of sphere using 8087 instruction set.
 Test case data: Pi = 3.1472 radius = 5.0

```

data segment
    a dd 4.0
    b dd 3.0
    pi dd 3.1472
    r dd 5.0
    vol dd ?
data ends

code segment
    assume cs:code, ds:data
    start:
    mov ax,data
    mov ds,ax

    finit
    fld a
    fld b
    fdiv
    fld pi
    fmul
    fmul r
    fmul r
    fmul r
    fst vol
    int 3

    code ends
end start

```

Output:

```

46 0000 add [bx+si],al es 449D
48 [ ]=80486 IPTR=000000 OPTR=000000 OPTR=000000=2=[ ]
4A Valid ST(0) 524.53335126241048 im=1 ie=0
4C Empty ST(1) dm=1 de=0
Empty ST(2) zm=1 ze=0
00 Empty ST(3) om=1 oe=0
08 Empty ST(4) um=1 ue=0
10 Empty ST(5) pm=1 pe=1
18 Empty ST(6) iem=0 ir=0
Empty ST(7) pc=3 cc=1
rc=0 st=7
ic=0

```

```

[ ]=Dump 3=[↑][↓]
ds:0000 0E 00 80 40 00 00 40 40 00 00 00
ds:0008 BA 6B 49 40 00 00 A0 40 00 00 00
ds:0010 22 22 03 44 00 00 00 00 00 00 00
ds:0018 00 00 00 00 00 00 00 00 00 00 00

```

4. Write an ALP to find $c = \sqrt{a^2 + b^2}$

Test case data: $a = 5.0$ $b = 3.0$

```

data segment
    a dd 3.0
    b dd 5.0
    res dd ?
data ends
code segment
    assume cs:code, ds:data
start:
    mov ax, data
    mov ds, ax
    finit
    fld a
    fld a
    fmul
    fld b
    fld b
    fmul
    fadd
    fsqrt
    fst res
    int 3
code ends
end start

```

Output:

```

[ ]=80486 IPTR=00000 OPTR=00000 OPTR=00000 2=[↑][↓]
Valid ST(0) 5.8309518948453005
Empty ST(1)
Empty ST(2)
Empty ST(3)
Empty ST(4)
Empty ST(5)
Empty ST(6)
Empty ST(7)
im=1 ie=0
dm=1 de=0
zm=1 ze=0
om=1 oe=0
um=1 ue=0
pm=1 pe=1
iem=0 ir=0
pc=3 cc=1
rc=0 st=7
ic=0

```

```

DSFH      fsqrt      | sp 0000
[ ]=Dump      3=[ ]=[ ]
ds:0000 00 00 40 40 00 00 A0 40 ee ae
ds:0008 28 97 BA 40 00 00 00 00 C0 00
ds:0010 B8 AD 44 8E D8 9B DB E3 7D A0 C0 00
ds:0018 9B D9 06 00 00 9B D9 06 C0 00 C0 00
Emmu ST(3)      nm=1

```

Floating Point Representation:

→ Floating Point Representation

Example :-

1) 89.625 to IEEE 754 single precision format

89 in binary is 1011001	.625 $\times 2$
.625 in binary is 101	1.250 $\rightarrow 1$
	$\times 2$
1011001.101	0.500 $\rightarrow 0$
1.011001101 $\times 2^6$	$\times 2$
	1.0 $\rightarrow 1$
<u>mantisa</u>	

Exponent = 6 + 127 = 133

sign bit	mantissa		exponent	mantissa	
↓					
→	0	100000	101	01100110100	...
	4	2	8	3	4

42B34000H

2) 89.625 to IEEE 754 double precision

89.625 in binary

$$1.\underbrace{011001101}_{\text{mantissa}} \times 2^6 \quad \text{from previous que}$$

$$\text{Exponent} = 6 + 1023 = 1029$$

$$\rightarrow \underbrace{0}_{4} \underbrace{10000000101}_{05} \underbrace{011001101}_{68} 0 \dots 0$$

40566800 00000000 H

3) -56.625 to IEEE 754 single precision

$$111000.101$$

$$1.\underbrace{11000101}_{\text{mantissa}} \times 2^5$$

$$\text{exponent} = 5 + 127 = 132$$

$$\rightarrow \underbrace{1}_{C} \underbrace{10000100}_{26} \underbrace{110001010}_{28} \dots 0$$

62628000 H

Date: / /

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4) -56.625 to IEEE 754 double precision

→ -56.625 in binary 111000.101

1.11000101 $\times 2^5$
mantissa

exponent = 5 + 1023 = 1028

→ 1 10000000100 110001010...0
C 0 4 C 5 0

[C04C5000 00000000 H]