

**Source File:** ~/4301/11/lab11.asm  
**Input:** Standard Input  
**Output:** Standard Output  
**Value:** 2

In mathematics, the **Fibonacci numbers**, commonly denoted  $F_n$ , form a sequence, called the **Fibonacci sequence**, such that each number is the sum of the two preceding ones, starting from 0 and 1. That is,

$$F_0 = 0, F_1 = 1,$$

and

$$F_n = F_{n-1} + F_{n-2}$$

for  $n > 1$ . The sequence starts

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

Write an assembly language program that will read an integer for  $n$  from standard input. Use a loop to determine  $F_0$  through  $F_n$  using the above description. The format of the output is shown below.

Commands to assemble, link, and run your program are shown in Figure 1.

```
1 newuser@csunix ~> cd 4301
2 newuser@csunix ~/4301> mkdir 11
3 newuser@csunix ~/4301> cd 11
4 newuser@csunix ~/4301/11> cp /usr/local/4301/src/Makefile .
5 newuser@csunix ~/4301/11> # Edit Makefile to add a target of lab11 to
6 newuser@csunix ~/4301/11> # targetsAsmLanguage
7 newuser@csunix ~/4301/11> touch lab11.asm
8 newuser@csunix ~/4301/11> # Edit lab11.asm
9 newuser@csunix ~/4301/11> ls
10 Makefile lab11.asm
11 newuser@csunix ~/4301/11> make lab11
12 nasm -f elf32 -o lab11.o lab11.asm -I/usr/local/4301/include/ -I.
13 ld -m elf_i386 --dynamic-linker /lib/ld-linux.so.2 -o lab11 lab11.o \
14 /usr/local/4301/src/Along32.o -lc
15 newuser@csunix ~/4301/11> ls
16 Makefile lab11 lab11.asm lab11.o
17 newuser@csunix ~/4301/11> echo 0 | ./lab11
18 Fib(0) = 0
19 newuser@csunix ~/4301/11> echo 1 | ./lab11
20 Fib(0) = 0
21 Fib(1) = 1
22 newuser@csunix ~/4301/11> echo 2 | ./lab11
23 Fib(0) = 0
24 Fib(1) = 1
25 Fib(2) = 1
26 newuser@csunix ~/4301/11> echo 3 | ./lab11
27 Fib(0) = 0
28 Fib(1) = 1
29 Fib(2) = 1
30 Fib(3) = 2
```

**Figure 1.** Commands to Assemble, Link, & Run Lab 11 (Part 1 of 3)

```
31 newuser@csunix ~/4301/11> echo 4 | ./lab11
32 Fib(0) = 0
33 Fib(1) = 1
34 Fib(2) = 1
35 Fib(3) = 2
36 Fib(4) = 3
37 newuser@csunix ~/4301/11> echo 5 | ./lab11
38 Fib(0) = 0
39 Fib(1) = 1
40 Fib(2) = 1
41 Fib(3) = 2
42 Fib(4) = 3
43 Fib(5) = 5
44 newuser@csunix ~/4301/11> echo 6 | ./lab11
45 Fib(0) = 0
46 Fib(1) = 1
47 Fib(2) = 1
48 Fib(3) = 2
49 Fib(4) = 3
50 Fib(5) = 5
51 Fib(6) = 8
52 newuser@csunix ~/4301/11> echo 7 | ./lab11
53 Fib(0) = 0
54 Fib(1) = 1
55 Fib(2) = 1
56 Fib(3) = 2
57 Fib(4) = 3
58 Fib(5) = 5
59 Fib(6) = 8
60 Fib(7) = 13
61 newuser@csunix ~/4301/11> echo 8 | ./lab11
62 Fib(0) = 0
63 Fib(1) = 1
64 Fib(2) = 1
65 Fib(3) = 2
66 Fib(4) = 3
67 Fib(5) = 5
68 Fib(6) = 8
69 Fib(7) = 13
70 Fib(8) = 21
71 newuser@csunix ~/4301/11> echo 9 | ./lab11
72 Fib(0) = 0
73 Fib(1) = 1
74 Fib(2) = 1
75 Fib(3) = 2
76 Fib(4) = 3
77 Fib(5) = 5
78 Fib(6) = 8
79 Fib(7) = 13
```

**Figure 1.** Commands to Assemble, Link, & Run Lab 11 (Part 2 of 3)

```
80 Fib(8) = 21
81 Fib(9) = 34
82 newuser@csunix ~/4301/11> echo 10 | ./lab11
83 Fib(0) = 0
84 Fib(1) = 1
85 Fib(2) = 1
86 Fib(3) = 2
87 Fib(4) = 3
88 Fib(5) = 5
89 Fib(6) = 8
90 Fib(7) = 13
91 Fib(8) = 21
92 Fib(9) = 34
93 Fib(10) = 55
94 newuser@csunix ~/4301/11> echo 11 | ./lab11
95 Fib(0) = 0
96 Fib(1) = 1
97 Fib(2) = 1
98 Fib(3) = 2
99 Fib(4) = 3
100 Fib(5) = 5
101 Fib(6) = 8
102 Fib(7) = 13
103 Fib(8) = 21
104 Fib(9) = 34
105 Fib(10) = 55
106 Fib(11) = 89
107 newuser@csunix ~/4301/11> echo 12 | ./lab11
108 Fib(0) = 0
109 Fib(1) = 1
110 Fib(2) = 1
111 Fib(3) = 2
112 Fib(4) = 3
113 Fib(5) = 5
114 Fib(6) = 8
115 Fib(7) = 13
116 Fib(8) = 21
117 Fib(9) = 34
118 Fib(10) = 55
119 Fib(11) = 89
120 Fib(12) = 144
121 newuser@csunix ~/4301/11>
```

**Figure 1.** Commands to Assemble, Link, & Run Lab 11 (Part 3 of 3)