

# Programming the TI-83/84 Plus FACTSUB

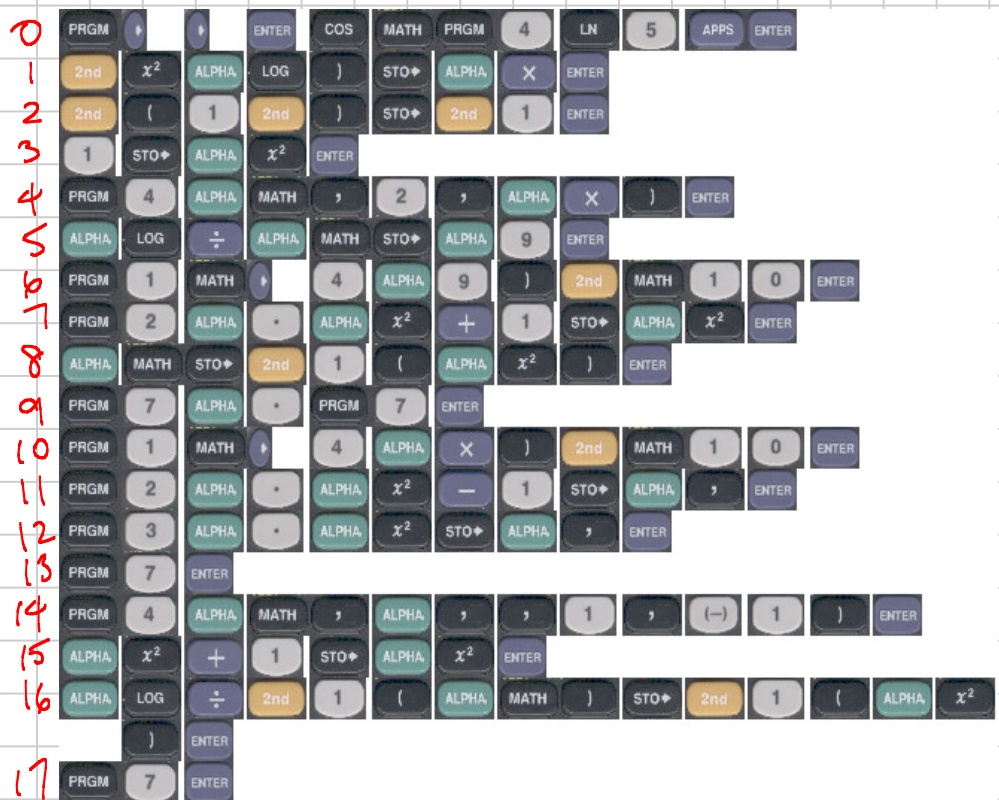
Note Title

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This is a subroutine that will be used by some of our other programs. This calculates all factors of a number and stores them in List 1. As you know factoring is one of our 3 main tools to solve problems. So this is a handy tool.

To find all factors of  $n$ , we simply check all the numbers from 1 to  $\sqrt{n}$  and if it is divisible, then it is a factor. To calculate the other half of the factor pair, we use the quotient. If  $n$  is a perfect square, we don't make  $\sqrt{n}$  a factor pair.

```
0 PROGRAM:FACTSUB
1 :√(N)→R
2 : (1)→L1
3 : 1→I
4 : For(A,2,R)
5 : N/A→Q
6 : If fPart(Q)=0
7 : Then:I+1→I
8 : A→L1(I)
9 : End:End
10 : If fPart(R)=0
11 : Then:I-1→J
12 : Else:I→J
13 : End
14 : For(A,J,1,-1)
15 : I+1→I
16 : N/L1(A)→L1(I)
17 : End
```

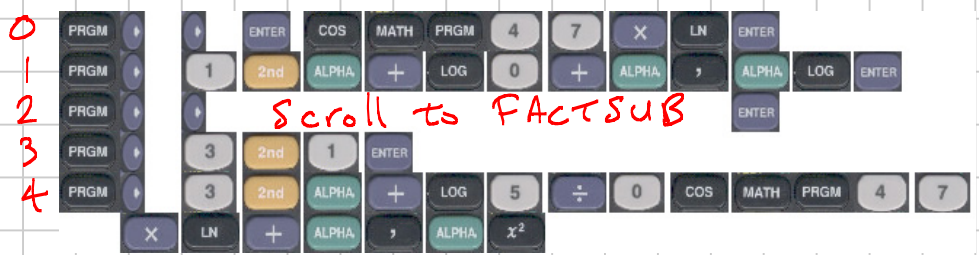


We need a very short program to test our subprogram.

```

0 PROGRAM:FACTORS
1 :Input "N ",N
2 :prgmFACTSUB
3 :Disp L1
4 :Disp "NUM FACTO
RS ",I

```



Test the following values to make sure everything is entered correctly.

```

prgmFACTORS
N 9
      (1 3 9)
NUM FACTORS
                3
                Done

```

```

prgmFACTORS
N 12
      (1 2 3 4 6 12)
NUM FACTORS
                6
                Done

```

```

prgmFACTORS
N 7
      (1 7)
NUM FACTORS
                2
                Done

```

Here is another short program that uses factoring. More specifically, it looks at the number of factors. If it is 2, then it is prime. If it is odd, then it is a perfect square. Otherwise the number is not prime.

```

0 PROGRAM:ISPRIME
1 :Input "N ",N
2 :prgmFACTSUB
3 :If I=2
4 :Then:Disp " IS
PRIME"
5 :Else:If fPart(I
/2)≠0
6 :Then:Disp " IS
A PERFECT"
7 :Disp " SQUARE"
8 :Else:Disp " IS
NOT PRIME"
9 :End:End

```



Although it looks long, most of it is text so there is not much to debug.

Test the following values to make sure everything is entered correctly.

```
prgmISPRIME
N 13
IS PRIME
Done
```

```
prgmISPRIME
N 81
IS A PERFECT
SQUARE
Done
```

```
prgmISPRIME
N 72
IS NOT PRIME
Done
```