TI-83 prgm PIVOT

This program carries out the pivot operation using "fraction form" arithmetic at the pivot element in column C and row R of the table of numbers stored in matrix [A]. Since the pivot operation for the "simplex method" chooses the pivot column and then the pivot row, this program asks for C and then R.

Program Operation

(1)   Enter your simplex tableau in matrix [A] using <u>MATRX</u> <u>EDIT</u> <u>1</u> and then leave the matrix editor by <u>2nd</u> <u>QUIT</u>.

(2)   Select the program PIVOT by pressing <u>PRGM</u> and either pressing the number shown next to this program or by using the up/down arrows to highlight the number shown next to this program and pressing <u>ENTER</u> .

(3)   The TI-83 screen will display prgmPIVOT. Press <u>ENTER</u> to start the program.

(4)   Press <u>ENTER</u> to begin the program (the other choices give further information about this program or allow you to quit). The current values in the matrix [A] will be displayed and if you don't see all of it, you can scroll to other parts using the arrow keys. Press <u>ENTER</u> when you are ready to select the pivot column and the pivot row.

(5)   The prompt <u>P C?</u> stands for "<u>P</u>ivot <u>C</u>olumn? " Enter the number of the pivot column and press <u>ENTER</u> .

   The prompt <u>P R?</u> stands for "<u>P</u>ivot <u>R</u>ow? " Enter the number of the pivot row and press <u>ENTER</u> .

   If you should enter a column or row number too small or too large, the program will respond with BAD, while if your pivot column and row select a zero for the pivot element, the program will respond with NOT ON ZERO. Press <u>ENTER</u> to run the program again.

   If you press a button that causes an error message of the form ERR:SYNTAX — or any other statement after the letters ERR: — press <u>1</u> to QUIT and then press <u>ENTER</u> to run the program again.

(6)   The program will carry out the pivot operation and display the new matrix [A].

You can scroll to other parts of it using the arrow keys. Press <u>ENTER</u> when you are finished.

(7) If you are ready to pivot at another pivot element, press <u>ENTER</u> to run the program again using the new numbers in your matrix [A]. When you are finished, press <u>4</u> to QUIT and the program will conclude with the statement Done.

Example

To solve the linear programming problem

maximize $P = 5x_1 + 7x_2$

subject to
$$x_1 + 2x_2 \le 8$$
$$x_1 + x_2 \le 5$$
$$x_1 \ge 0 \text{ and } x_2 \ge 0$$

with initial simplex tableau

	x_1	x_2	s_1	s_2	
s_1	1	2	1	0	8
s_2	1	1	0	1	5
P	–5	–7	0	0	0

we proceed as follows.

(1)
```
NAMES MATH EDIT
1▪[A]
2:[B]
3:[C]
4:[D]
5:[E]
6:[F]
7↓[G]
```
```
MATRIX[A]  3 ×5
[1    2    1   -
[1    1    1
[-5   -7   0▪
3,3=0
```

(2)
```
▪▪▪ EDIT NEW
1:AMORTABL
2:BINOMIAL
3:MARKOV
4▪PIVOT
5:ROWOPS
6:SEENORML
7:VIEWLP
```

(3)
```
prgmPIVOT
```

(4)
```
    PIVOT
1▪CONTINUE
2:       COPYRIGHT
3:       TECH INFO
4:QUIT
```

(5)
```
[[1    2    1  0  8]
 [1    1    0  1  5]
 [-5  -7    0  0  0]]
P C? 2
P R? 1
```

(6)
```
[1    1    0  1  5]
[-5  -7    0  0  0]]
P C? 2
P R? 1
[[1/2   1  1/2  0…
 [1/2   0  -1/2 1…
 [-3/2  0  7/2  0…
```
```
[1    1    0  1  5]
[-5  -7    0  0  0]]
P C? 2
P R? 1
     1  1/2  0 4 ]
…    0  -1/2 1 1 ]
…2   0  7/2  0 28]]
```

(7) Continuing for another pivot,

```
    PIVOT
1▪CONTINUE
2:       COPYRIGHT
3:       TECH INFO
4:QUIT
```
```
[1/2  0 -1/2 1…
[-3/2 0 7/2  0…
P C? 1
P R? 2
[[0 1  1  -1 3 ]
 [1 0 -1  2  2 ]
 [0 0  2  3  31]]
```
then
```
    PIVOT
1:CONTINUE
2:       COPYRIGHT
3:       TECH INFO
4▪QUIT
```
```
PROGRAM FINISHED

        Done
```

This final tableau shows that the maximum is 31 when $x_1 = 2, x_2 = 3$.