Unit 3: Conditional Statements | **Skill Builder 2: If…Then…End and Compound Conditions**

In this second lesson for Unit 3 you will learn about a much better conditional structure and compound conditions.

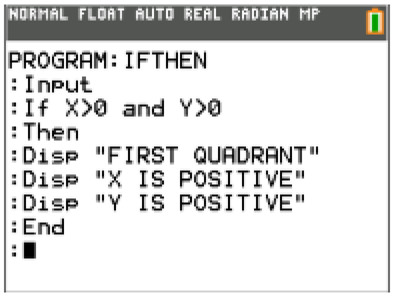
Objectives:

- Examine the **If…Then…End** structure.
- Make compound conditions with the logical operators.
- Write a program using the **If…Then…End** structure that examines the regions of the coordinate plane.

The If…Then…End structure

TI Basic has a unique **If…Then** structure that makes use of the **End** keyword to control the statements that form the block of code that will be processed when the condition is true. It looks like this:

If *<condition>*
Then
<true block: do these statements when the <condition> is true
End

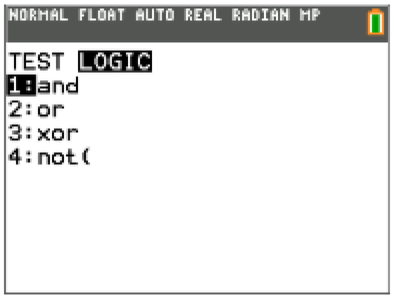


```
NORMAL FLOAT AUTO REAL RADIAN MP
PROGRAM:IFTHEN
:Input
:If X>0 and Y>0
:Then
:Disp "FIRST QUADRANT"
:Disp "X IS POSITIVE"
:Disp "Y IS POSITIVE"
:End
:
```

Note:
***If** is followed by some <condition>.*
***Then** is <u>immediately</u> below **If,** set on a line by itself.*
There are <u>one or more</u> statements in the <true block>.
***End** indicates the end of the **Then** block and the statements below **End** <u>will</u> be processed.*
***End is <u>not</u> the end of the program**! It is the End of the **If…Then…End** structure.*

Compound Conditions

Compound conditions involve more than one relational expression. The logical operators **and**, **or**, **xor** and **not(** are found on the [TEST] LOGIC menu. These operators allow you to build compound conditions.



```
NORMAL FLOAT AUTO REAL RADIAN MP
TEST LOGIC
1:and
2:or
3:xor
4:not(
```

Examples:

- X>0 **and** Y>0 is true when both X and Y are positive
- X>0 **or** Y>0 is true when either X or Y is positive (or both)
- **not(**X>0 **and** Y>0) is true when either X or Y is not positive
  it means the same as **X<=0 or Y<=0**
- X>0 **xor** Y>0 is true when either X or Y is positive *but not both*
  it means the same as… **X>0 or Y>0 and not(X>0 and Y>0)**

xor stands for 'exclusive or' and is true when either part is true but not both parts.
You cannot 'string together' the relational operators: 2<A<3 is interpreted to mean "A is between 2 and 3" and must be coded as **2<A and A<3.** The logical operators have an order of operations just like the arithmetic operators +, - , *, and /.

A<0 or A<5 and A>2 means A can be negative or between 2 and 5.
and is processed before **or** (similar to 'multiplication before addition').

Programming with If…Then…End Statements

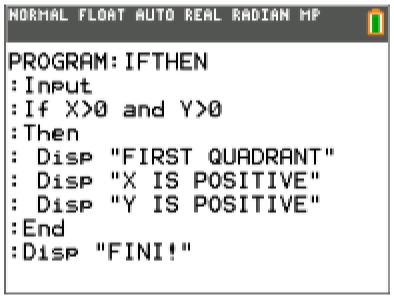
Try the **IFTHEN** program to the right.

*Note: **Input** has no variable. This is a special feature of TI-Basic. Recall from Unit 2 that the GRAPH screen will appear so that you can move the cursor anywhere and press [ENTER] to set values for **X** and **Y**.*

*‘**and**’ is on the [TEST] **LOGIC** menu.*

Then** is on a line by itself right below **If

***End** is the bottom of the ‘true’ block (the set of statements that are executed when the condition is true). It is not the end of the program.*

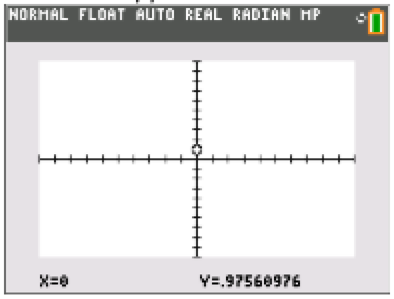


```
PROGRAM:IFTHEN
:Input
:If X>0 and Y>0
:Then
: Disp "FIRST QUADRANT"
: Disp "X IS POSITIVE"
: Disp "Y IS POSITIVE"
:End
:Disp "FINI!"
```

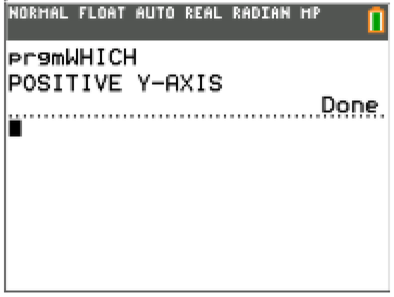
Complete the Program

A graph has several named regions: Quadrants I, II, III, and IV and the positive and negative *x* and *y* axes. Let’s write a program that allows the user to select a point on the GRAPH screen and then the program will tell where the point lies using those names.

Running the program cause this screen to appear…



…and pressing enter at that position causes this:



```
prgmWHICH
POSITIVE Y-AXIS
                     Done
```

We’ll start you off with a few **If** statements and you can finish the rest:

```
Input          notice, no variable!
Disp X,Y
If X>0 and Y>0
Then
Disp "FIRST QUADRANT"
End
If X=0 and Y>0
Then
Disp "POSITIVE Y-AXIS"
End
If X<0 and Y>0
Then
Disp "SECOND QUADRANT"
End
.
.
.
```

You should have eight **If** structures (for the four quadrants and the four half-axes).