To draw an approximate trajectory in the xy-plane for the first order DE

\[ y'(x) = f(x,y) \]

with initial condition \( y(x_0) = y_0 \).

The method used is the Improved Euler algorithm (also known as Heun’s method):

\[ y_{i+1} = y_i + h \frac{f(x_i, y_i) + f(u_i, v_i)}{2} \]

where \( u_i = y_i + hf(x_i, y_i) \)

**Input:** The user is prompted for the starting values \( x_0 \), and \( y_0 \) and stepsize \( h \)

The function \( f(x,y) \) are specified in function register \( y_1 \).

**Output:** a graph of the xy-plane showing the approximate trajectory starting at \( x_0, y_0 \).

Note: to halt the program, press the OFF key.

**PROGRAM IEULER**

1. `FnOff`
2. `Prompt X,Y,H`
3. `Lbl P`
4. `X A`
5. `Y B`
6. `Y + HU Y`
7. `X + H X`
8. `B + H(U + Y) / 2 Y`
9. `Line(A,B,X,Y)`
10. `Goto P`

**Command Location**

- VARS, Y-VARS, On/Off
- PRGM I/O
- PRGM Ctl

- Line: DRAW 2
- PRGM Ctl