Problem 2

OBJECTIVES: To evaluate a differential equation using Heun's method.

ALGORITHM:

1. Start
2. Define function, $f(x, y)$
3. Assign an initial value for x_0, y_0, x_n and h. [where, x_0 and y_0 = initial conditions, x_n= required value and h = interval.]
4. While $(x_0 + h \leq x_n)$
5. Compute m1 = $f(x_0, y_0)$
   and m2 = $f(x_0 + h,\ y_0 + m1 \times h)$.
6. Find the improved estimate of x_0 and y_0.
   $y_0 = y_0 + (h/2)(m1 \times m2)$
   $x_0 = x_0 + h$
7. print x_0 and y_0.
8. End
9. print the final x_0 and y_0
10. Stop.

Sample Input/output:

Evaluating Heun's method for $f(x, y) = (2y/x)$ or $f(x, y) = \frac{2y}{x}$

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Enter value for (X0,Y0) = 1 2
Enter Xn = 2
Enter h = 0.25
X = 1.250000    Y = 3.100000
X = 1.500000    Y = 4.443333
X = 1.750000    Y = 6.030238
X = 2.000000    Y = 7.860846

Value of Y at X = 2.0000 is 7.8608
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Tasks:

Write a code to evaluate a differential equation using Heun's method.