Chapter 11 / **Example 25**
Euler's method

Use Euler's method with step size 0.1 to approximate the solution to the initial value problem $\dfrac{\mathrm{d}y}{\mathrm{d}x} = xy$ and $y(1) = 1$, and estimate the value of $y(2)$.

To enter iterative formulas press $\boxed{\text{MODE}}$. Use the | } ~ † keys to place the cursor on SEQ in the Mode menu, and then press $\boxed{\text{ENTER}}$ to highlight it.	
Press $\boxed{\text{F1}}$ $\boxed{\text{Y=}}$ to display the sequence entry screen. When using Euler's method, since the boundary condition is (x_0, y_0), the minimum value of n is 0. set nMin to 0 and press $\boxed{\text{ENTER}}$.	
The TI-84 Plus C uses u and v in place of x and y. $x_n = x_{n-1} + 0.1$ Set u(n) to u(n−1) + 0.1 and press $\boxed{\text{ENTER}}$. To enter u, press $\boxed{\text{2nd}}$ $\boxed{7}$ [u] and to enter n press $\boxed{\text{X,T,Θ,}n}$.	
Since an iterative formula defines each term in terms of the previous one, you must enter the first term, u(0). Set u(nMin) to 1 and press $\boxed{\text{ENTER}}$.	
$y_n = y_{n-1}(1 + 0.1 x_{n-1})$ Set v(n) to v(n-1) (1 + 0.1 u(n-1)) and press $\boxed{\text{ENTER}}$. To enter v, press $\boxed{\text{2nd}}$ $\boxed{8}$ [v].	

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Enter the initial value of v(n). Set v(nMin) to 1 and press ENTER.	Plot1 Plot2 Plot3 nMin=0 ∎\u(n)◻u(n-1)+0.1 u(nMin)◻{1} ∎\v(n)◻v(n-1)(1+0.1u(n-1)) v(nMin)◻{1} ∎\w(n)= w(nMin)=
To view the sequences open the table of values by pressing 2nd GRAPH [TABLE]. From the table, $y(2) = 3.86$.	n / u(n) / v(n) 0 / 1 / 1 1 / 1.1 / 1.1 2 / 1.2 / 1.221 3 / 1.3 / 1.3675 4 / 1.4 / 1.5453 5 / 1.5 / 1.7616 6 / 1.6 / 2.0259 7 / 1.7 / 2.35 8 / 1.8 / 2.7495 9 / 1.9 / 3.2444 10 / 2 / 3.8609 n=0