From Chapter 3:

Odd-numbered solutions begin on page ??



More Challenging Problems:

You can use a spreadsheet to do Euler's method of sums. In the next problem, we ask you to use a spreadsheet to reproduce the chart on page 211:

t	w	w' (= .02w)	$\Delta w \ (\approx w' \cdot \Delta t)$
0	6	.12	1.2
10	6+1.2=7.2	.144	1.44
20	7.2 + 1.44 = 8.64	.1728	1.728
30	8.64+1.728=10.368	.20736	2.0736
40	10.368 + 2.0737 = 12.4416	.248832	2.48832
50	12.4416 + 2.48832 = 14.92992		

 a. First, label your columns across the top row of your spreadsheet. Just type the labels in the cells, so that your top row looks like this:

	A	В	С	D
1	t	W	w≒.02w	delta w

b. In the next row you'll enter numbers and formulas. In the first two cells (A2 and B2) type in the (given) initial values for tand w, namely 0 and 6.

In the third cell you'll put in the formula that'll compute w'. Since w' = .02w, the formula to enter in cell C2 is "=.02*B2", because cell B2 contains the current value for w. (The * means multiply.)

Finally, in cell D2 you'll type in the formula to compute Δw . Since $\Delta w = w' \Delta t$, type in "=C2*10", because C2 contains the current value for w', and we're using time intervals of length $\Delta t = 10$. Now your spreadsheet should

look like this:

	A	В	С	D
1	t	W	w≒.02w	delta w
2	0	6	0.12	1.2
2				

Notice that numbers appear in cells in which you entered formulas. If you wish to see the formula in a cell, highlight it, and the formula will show up at the top (or maybe bottom) of your spreadsheet.

c. The Euler sum we're working on uses ten-year time intervals, so you need t to go up by 10 for each new row. In A3 type "=A2+10", which will result in a t value in A3 which is 10 more than the value in A2. In B3 you'll want the formula for a new w, which is computed from the old w (now in B2) plus the change in w (now in D2). So in B3 type in the formula "=B2+D2".

In C3 and D3 you need the same formulas as in C2 and D2, except that they need to refer to the new values for w and w', (which are in row 3) not the old ones (which are in row 2). Here's where we exploit the power of spreadsheet programs. If we just copy and paste the formulas for cells C2 and D2 into C3 and D3, the program will automatically adjust the formulas to refer to the cells in row 3. You can copy and paste by using the standard editing tools on the spreadsheet, usually by dragging the cursor over the cells you wish to copy. Your spreadsheet should now look like this:

	A	В	С	D
1	t	W	w≒.02w	delta w
2	0	6	0.12	1.2
3	10	7.2	0.144	1.44

d. Now finish the table by copying the entire row A3-D3 and pasting it into the block from A4-D7.

You should now have the table in the book (plus two extra cells, C7 and D7):

	A	В	С	D
1	t	W	w≒.02w	delta w
2	0	6	0.12	1.2
3	10	7.2	0.144	1.44
4	20	8.64	0.1728	1.728
5	30	10.368	0.20736	2.0736
6	40	12.4416	0.248832	2.48832
7	50	14.92992		

- 2. Using a spreadsheet for Euler's method, approximate the value of w(50) using a $\Delta t = 5$.
- 3. Using a spreadsheet for Euler's method, approximate the value of w(50) using a $\Delta t = 1$.
- 4. Using a spreadsheet for Euler's method, approximate the value of y(2) given that y'(t) = t and y(0) = 0. Use $\Delta t = .25$.
- 5. Using a spreadsheet for Euler's method, approximate the value of z(5) given that z'(t) = t z and z(0) = 1. Use $\Delta t = .5$.