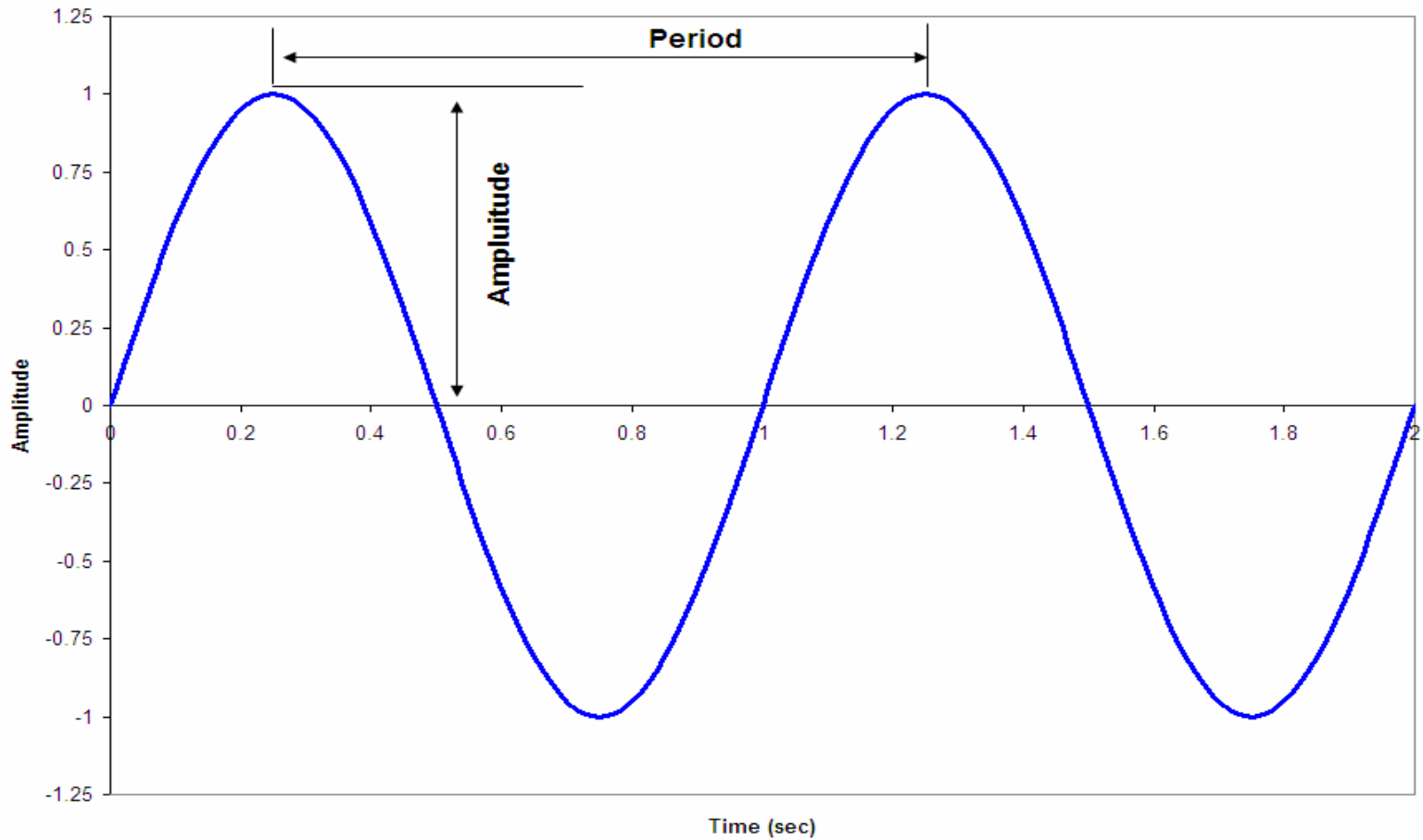
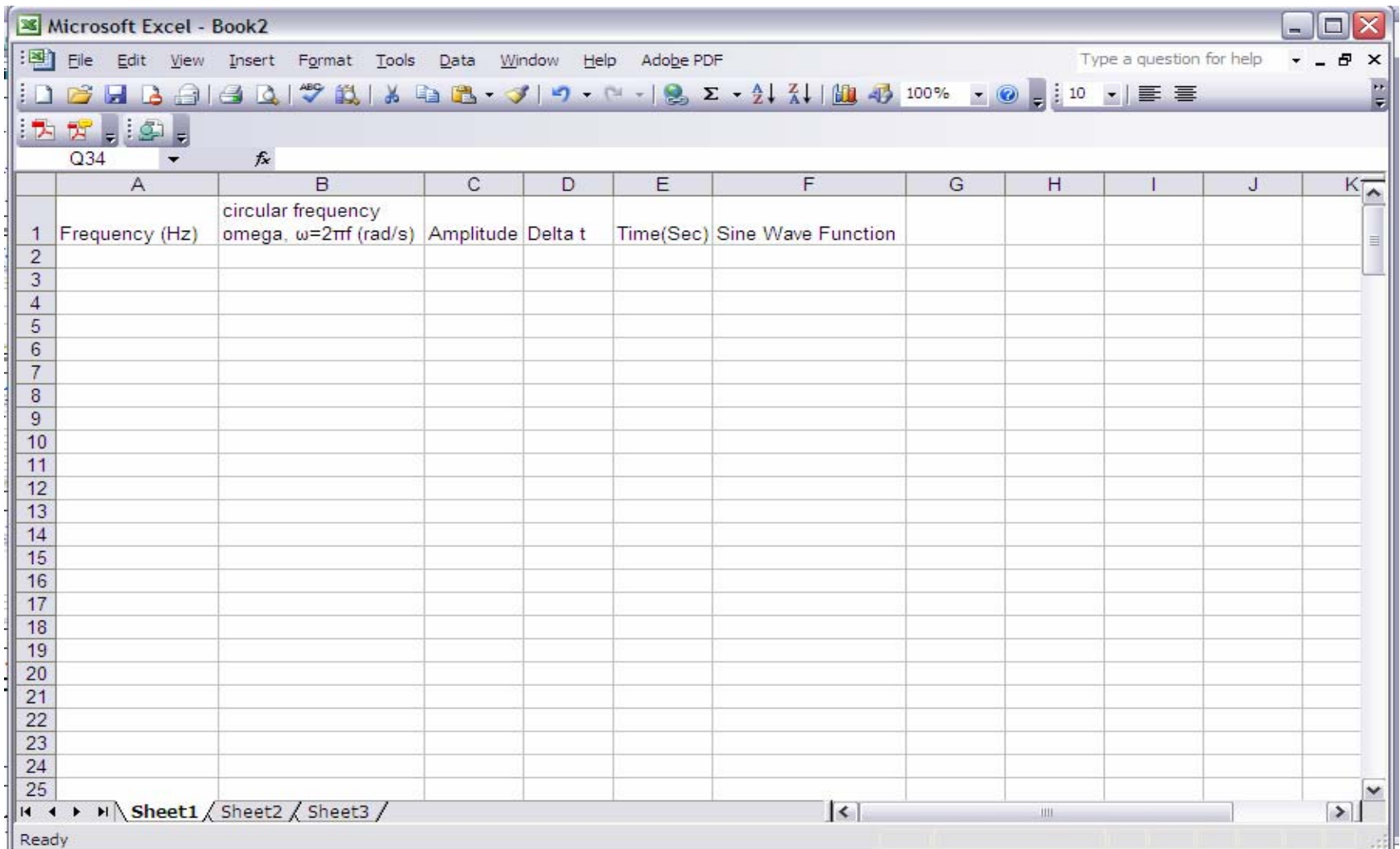


# Creating A Sine Wave In Excel



# Step 1. Create Columns in Excel for: Frequency, Circular Frequency, Omega (rad/s), Amplitude, Delta t, Time, and Sine Wave.





## Step 3. Fill in Columns for Time (sec.)

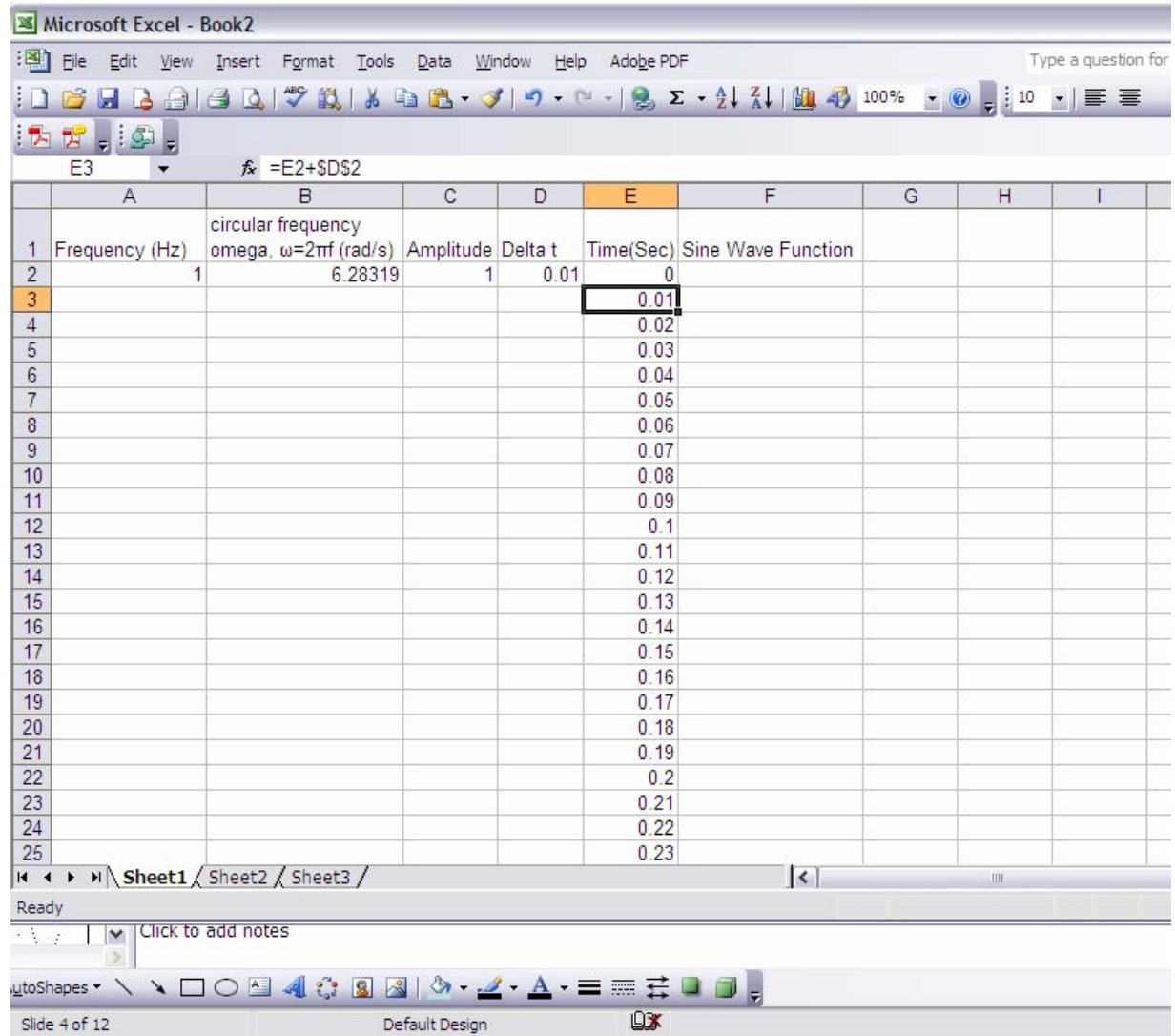
A. Enter in the initial time (in this example 0.0 sec.) in the first cell in the time column.

B. Fill in the time column using Equation 1.

$$t_{i+1} = t_i + \Delta t \text{ (Equation 1)}$$

Note: you need to fix the cell for delta t in Equation 1. This can be done by adding a \$ in front of the Row and Column values or by pressing 'F4'.

C. Highlight the desired number of rows in the time column and fill down (Ctrl +D).



Microsoft Excel - Book2

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for

E3 =E2+\$D\$2

	A	B	C	D	E	F	G	H	I
1	Frequency (Hz)	circular frequency omega, $\omega=2\pi f$ (rad/s)	Amplitude	Delta t	Time(Sec)	Sine Wave Function			
2	1	6.28319	1	0.01	0				
3					0.01				
4					0.02				
5					0.03				
6					0.04				
7					0.05				
8					0.06				
9					0.07				
10					0.08				
11					0.09				
12					0.1				
13					0.11				
14					0.12				
15					0.13				
16					0.14				
17					0.15				
18					0.16				
19					0.17				
20					0.18				
21					0.19				
22					0.2				
23					0.21				
24					0.22				
25					0.23				

Sheet1 Sheet2 Sheet3

Ready

Click to add notes

Slide 4 of 12

Default Design

## Step 4: Generating a Sine Wave

Recall: The sine wave or sinusoid in its most basic form is:

$$y(t) = A \cdot \sin(\omega t + \theta) \quad (\text{Equation 2})$$

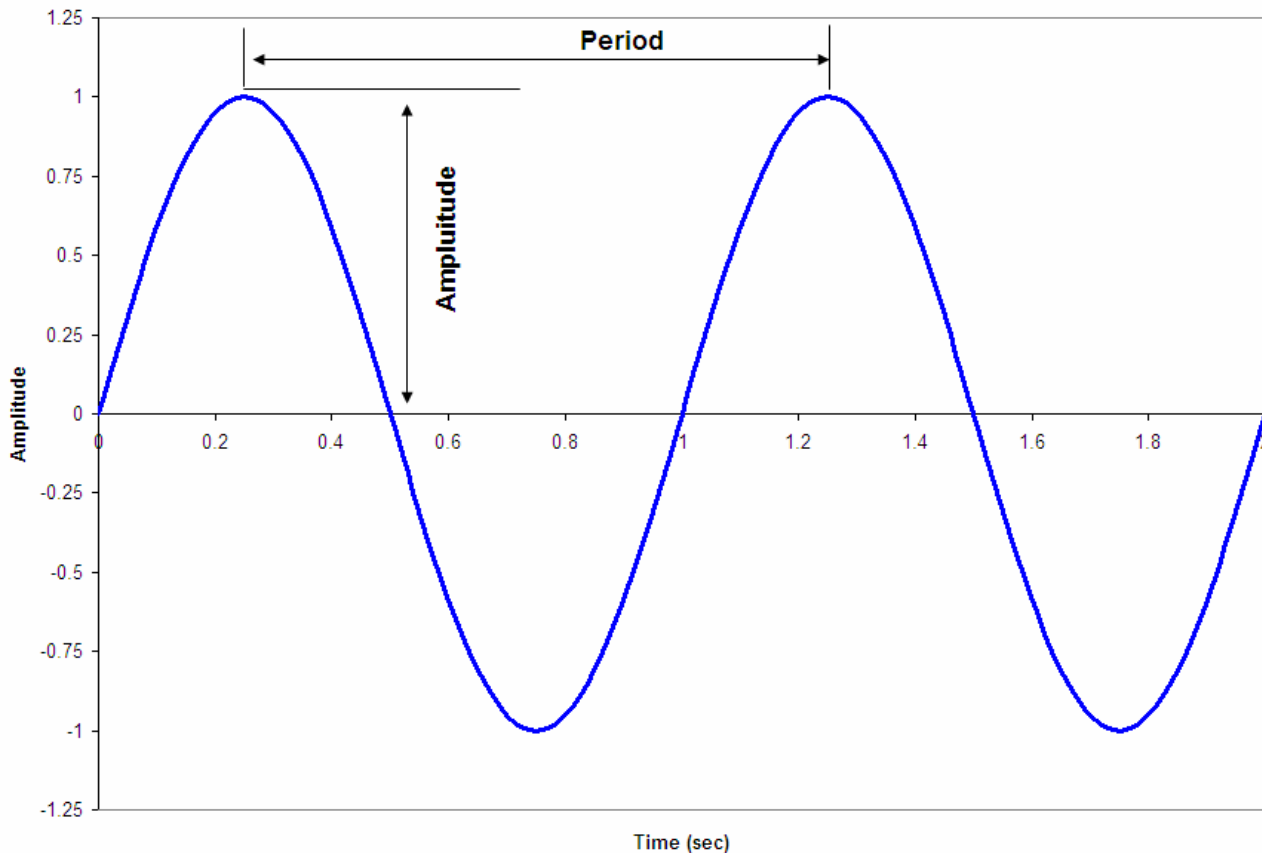
Where:

- $A$  = Amplitude
- $\omega$  = Angular frequency/ Circular frequency =  $2\pi f$  (rad/s)
- $f = 1/T$ , where  $T$  = Period in seconds
- $\theta$  = phase
- $t$  = time (s)

## Step 4: Generating a Sine Wave (Cont.)

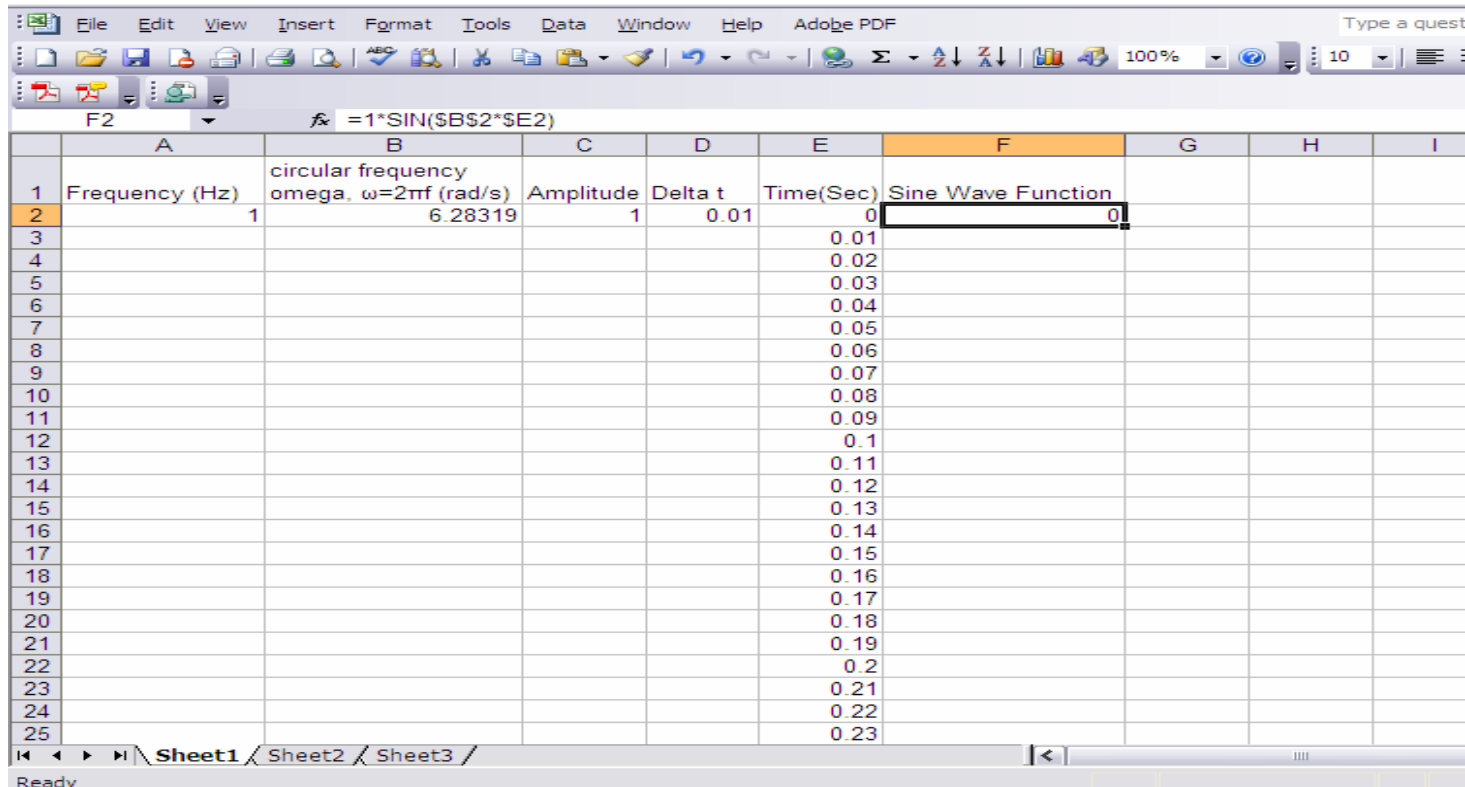
For this example: Generate a 1Hz Sine Wave, with  $\omega=2\pi$  and Amplitude 1.

$f = 1 \text{ Hz}$ ,  $\omega = 2\pi$ , therefore,  $T=1 \text{ sec}$ .



## Step 4: Generating a Sine Wave (Cont.)

- A. Enter the sine wave equation in the first cell of the sine wave column.
- B. This can be done by entering,  $=1*\text{SIN}(\$B\$2*\$E2)$ ;  
Notice:  $\omega$  column will be fixed using the \$ notation in front of the row and column and the time column changes.



The screenshot shows a spreadsheet application with the following data:

	A	B	C	D	E	F	G	H	I
1	Frequency (Hz)	circular frequency omega, $\omega=2\pi f$ (rad/s)	Amplitude	Delta t	Time(Sec)	Sine Wave Function			
2	1	6.28319	1	0.01	0	0			
3					0.01				
4					0.02				
5					0.03				
6					0.04				
7					0.05				
8					0.06				
9					0.07				
10					0.08				
11					0.09				
12					0.1				
13					0.11				
14					0.12				
15					0.13				
16					0.14				
17					0.15				
18					0.16				
19					0.17				
20					0.18				
21					0.19				
22					0.2				
23					0.21				
24					0.22				
25					0.23				

## Step 4: Generating a Sine Wave (Cont.)

C. Highlight the desired number of rows in the time column and fill down (Ctrl +D).

The screenshot shows a Microsoft Excel spreadsheet titled "Book2". The active cell is F2, containing the formula  $=1*\text{SIN}(\$B\$2*\$E2)$ . The spreadsheet is set up to generate a sine wave with the following parameters:

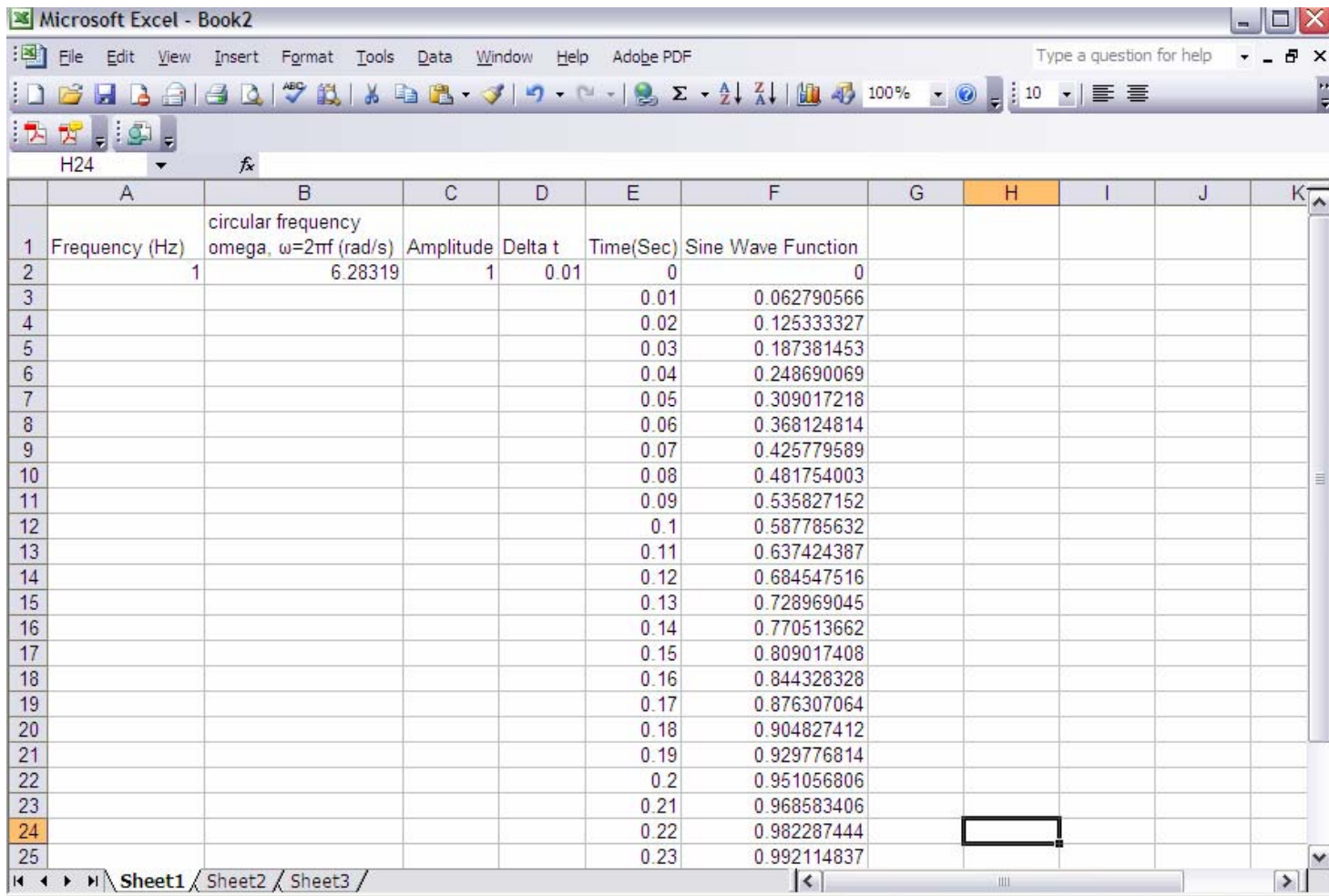
	A	B	C	D	E	F	G	H	I	J	K
1	Frequency (Hz)	circular frequency omega, $\omega=2\pi f$ (rad/s)	Amplitude	Delta t	Time(Sec)	Sine Wave Function					
2	1	6.28319	1	0.01	0	0					
3					0.01						
4					0.02						
5					0.03						
6					0.04						
7					0.05						
8					0.06						
9					0.07						
10					0.08						
11					0.09						
12					0.1						
13					0.11						
14					0.12						
15					0.13						
16					0.14						
17					0.15						
18					0.16						
19					0.17						
20					0.18						
21					0.19						
22					0.2						
23					0.21						
24					0.22						
25					0.23						

The Time (Sec) column (E) is highlighted from row 2 to 25. The Sine Wave Function column (F) contains the formula  $=1*\text{SIN}(\$B\$2*\$E2)$ . The spreadsheet is ready for the user to press Ctrl + D to fill down the formula in column F.



## Step 4: Generating a Sine Wave (Cont.)

### D. Sine Wave column after “Filling Down”



The screenshot shows a Microsoft Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K
1	Frequency (Hz)	circular frequency omega, $\omega=2\pi f$ (rad/s)	Amplitude	Delta t	Time(Sec)	Sine Wave Function					
2	1	6.28319	1	0.01	0	0					
3					0.01	0.062790566					
4					0.02	0.125333327					
5					0.03	0.187381453					
6					0.04	0.248690069					
7					0.05	0.309017218					
8					0.06	0.368124814					
9					0.07	0.425779589					
10					0.08	0.481754003					
11					0.09	0.535827152					
12					0.1	0.587785632					
13					0.11	0.637424387					
14					0.12	0.684547516					
15					0.13	0.728969045					
16					0.14	0.770513662					
17					0.15	0.809017408					
18					0.16	0.844328328					
19					0.17	0.876307064					
20					0.18	0.904827412					
21					0.19	0.929776814					
22					0.2	0.951056806					
23					0.21	0.968583406					
24					0.22	0.982287444					
25					0.23	0.992114837					

## Step 4: Generating a Sine Wave (Cont.)

E. Plot the time vs. your sine wave column, by going to chart wizard and selecting the XY scatter chart type.

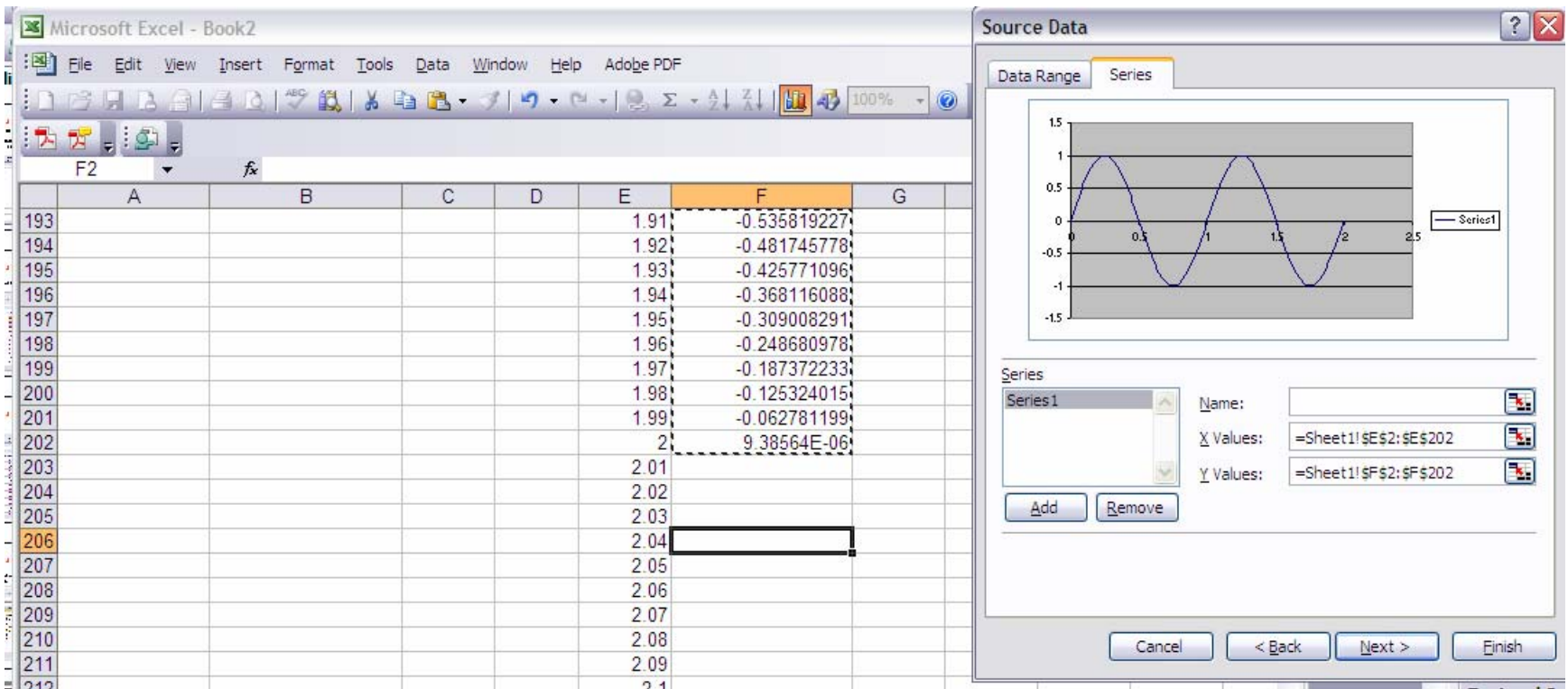
The screenshot shows the Microsoft Excel interface with a spreadsheet and a 'Chart Wizard - Step 1 of 4 - Chart Type' dialog box. The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I	J
1	Frequency (Hz)	circular frequency $\omega = 2\pi f$ (rad/s)	Amplitude	Delta t	Time(Sec)	Sine Wave Function				
2	1	6.28319	1	0.01						
3										
4										
5										
6										
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8										
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The 'Chart Wizard' dialog box is open, showing the 'Standard Types' tab. The 'Chart type' is 'XY (Scatter)' and the 'Chart sub-type' is 'Scatter with data points connected by lines without markers'. The dialog box also includes a 'Press and Hold to view Sample' button and navigation buttons: 'Cancel', '< Back', 'Next >', and 'Finish'.

## Step 4: Generating a Sine Wave (Cont.)

- F. Enter your data. Select the Series Tab, and select your x values as your time column and y values as your sine wave column.



## Step 4: Generating a Sine Wave (Cont.)

### G. Results

