## **Function Library**

In this course, we touched on one of the mathematical functions available to us in Excel; the SUM() function. Excel offers over 200 functions for your use! We won't cover all of them, but we will cover a few of the more important ones.

To access the **Function Library**, **Insert—Function** from the menu or click the *Function* button on the Tool bar. The screen at the right will appear. To select a function, first click on the category in the left panel, then click on the function in the right panel. Notice, that as you click on each function, a brief description of that function appears below the panels. Choose the *Statistical* category and the *Average* function, then click *OK* to proceed.





After you click OK, a *Function Wizard* is displayed in the upper left of your sheet. While this is a very useful window, many times, you need to refer to the cells that it covered! Don't fret, just move the window by click-and-dragging the window to a place that's out of the way. The bold dot in the figure to the left illustrates a good area to click on and the arrow shows where to move it to in this example. Essentially, when moving a window like this (note that there's no *title bar*), any unused area of the window should suffice.

Now that our Function Wizard window is out of the way, we can continue with building the function. Turn the page and let's go on.



paulj@clearcutcomputing.com www.clearcutcomputing.com

Microsoft Excel – F	<b>unction Library</b>
---------------------	------------------------

	<u>×</u> 1	Microsoft Excel	- Ma	th & for	mat.:	xls										_ 8 ×
Average       X       Image: Second s			_		_		<u>D</u> ata	Windo	W	<u>H</u> elp						_ B X
Ariel       ID       B       Z       D       E       E       B       Z       Wether and the state of		🖻 🖬 🎒 🖪 🖤	8	<b>B</b> (2)	<b>S</b>	 От (11 т		Σ	f <sub>*</sub>		9	100%	•	2		
A       B       C       D       E       F       G       H       I         1       Daily Average       2       \$       2,500       3       4       Monday       Tuesday       Wednesday       Thursday       Eriday       Site Total       Percent         5       Amityville       \$       700       \$       8500       \$       900       \$       1,200       \$       4,451       34%         6       Hicksville       \$       735       \$       625       \$       9500       \$       1,200       \$       4,451       34%         6       Hicksville       \$       735       \$       625       \$       9500       \$       1,200       \$       4,441       34%         7       Franklin Square       \$       500       \$       675       \$       700       \$       1,250       \$       1,196       \$       4,321       33%         8       Daily Total       \$       1,936       \$       2,150       \$       3,160       \$       3,520       \$       1,32,15         9       Increment       \$       214       \$       3000       \$       710       \$	Ari		10 .	- B Z	U			\$ %	_		1	=       - 🔊	- A			
A         B         C         D         E         F         G         H         I           1         Daily Average         2         \$ 2,500         3         4         Monday         Tuesday         Wednesday         Thursday         Friday         Site Total         Percent           5         Amityville         \$ 700         \$ 850         \$ 800         \$ 900         \$ 1,200         \$ 4,451         34%           6         Hicksville         \$ 735         \$ 625         \$ 950         \$ 1,010         \$ 1,220         \$ 4,451         34%           7         Franklin Square         \$ 025         \$ 950         \$ 1,010         \$ 1,124         \$ 4,444         34%           8         Daily Total         \$ 1,936         \$ 2,150         \$ 2,450         \$ 3,520         \$ 13,215           9         increment         \$ 214         \$ 300         \$ 710         \$ 360         \$ 3,520         \$ 13,215           10         Actual vs. Target         \$ (564)         \$ (350)         \$ (60)         \$ 660         \$ 1,020           11         Daily % Total         15%         16%         19%         24%         27%           12         Tererenet         \$ 16%																
2       \$       2,500         3       Monday       Tuesday       Wednesday       Thursday       Friday       Site Total       Percent         5       Amityville       \$       700       \$       850       \$       900       \$       1,200       \$       4,451       34%         6       Hicksville       \$       735       \$       625       \$       950       \$       1,010       \$       1,124       \$       4,444       34%         7       Franklin Square       \$       500       \$       675       \$       700       \$       1,250       \$       1,196       \$       4,321       33%         8       Daily Total       \$       1,936       \$       2,450       \$       3,160       \$       3,520       \$       13,215         9       Increment       \$       214       \$       300       \$       710       \$       360         10       Actual vs. Target       \$       (564)       \$       (350)       \$       (50)       \$       660       \$       1,020         11       Daily % Total       15%       16%       19%       24%       27%       \$								D		E		F		G	Н	
3       Monday       Tuesday       Wednesday       Thursday       Friday       Site Total       Percent         5       Amityville       \$       700       \$       850       \$       900       \$       1,200       \$       4,451       34%         6       Hicksville       \$       705       \$       625       950       \$       1,010       \$       1,124       \$       4,441       34%         7       Franklin Square       \$       500       \$       675       \$       700       \$       3,520       \$       13,215         9       Increment       \$       2,150       \$       2,450       \$       3,160       \$       3,520       \$       13,215         9       Increment       \$       2,150       \$       2,450       \$       3,160       \$       3,520       \$       13,215         10       Actual vs. Target       \$       (564)       \$       (350)       \$       (600)       \$       1,020       \$       102         11       Daily % Total       15%       16%       19%       24%       27%       \$       \$       =       1935.71,2150,245(         14 </td <td></td> <td>_</td>																_
4       Monday       Tuesday       Wednesday       Thursday       Friday       Site Total       Percent         5       Amityville       \$       700       \$       850       \$       900       \$       1,200       \$       4,451       34%         6       Hicksville       \$       735       \$       625       \$       900       \$       1,200       \$       4,444       34%         7       Franklin Square       \$       500       \$       675       \$       700       \$       1,250       \$       1,196       \$       4,321       33%         8       Daily Total       \$       1,936       \$       2,140       \$       3,160       \$       3,520       \$       1,32,215         9       Increment       \$       2,140       \$       300       \$       710       \$       360       -         10       Actual vs. Target       \$       (564)       \$       (350)       \$       (660)       \$       1,020       -       -       -         12       12       16%       19%       24%       27%       =       =       4,935,71,2150,2451       Number1       \$       8 </td <td></td> <td>\$ 2,500</td> <td></td>		\$ 2,500														
5       Arnityville       \$       700       \$       850       \$       900       \$       1,200       \$       4,451       34%         6       Hicksville       \$       735       \$       625       \$       950       \$       1,010       \$       1,124       \$       4,444       34%         7       Franklin Square       \$       500       \$       675       \$       700       \$       1,250       \$       1,196       \$       4,321       33%         8       Daily Total       \$       1,936       \$       2,450       \$       3,160       \$       3,520       \$       13,215         9       Increment       \$       214       \$       300       \$       710       \$       360         10       Actual vs. Target       \$       (154)       \$       (350)       \$       (50)       \$       660       \$       1,020         11       Daily % Total       15%       16%       19%       24%       27%       27%         12			hđ	onday	т	vebau	Made	vebau	т	hureday		Eriday	C i	to Total	Dorcont	
6       Hicksville       \$ 735       \$ 625       \$ 950       \$ 1,010       \$ 1,124       \$ 4,444       34%         7       Franklin Square       \$ 500       \$ 675       \$ 700       \$ 1,250       \$ 1,196       \$ 4,321       33%         8       Daily Total       \$ 1,936       \$ 2,150       \$ 2,450       \$ 3,160       \$ 3,520       \$ \$ 13,215         9       Increment       \$ 214       \$ 300       \$ 710       \$ 360         10       Actual vs. Target       \$ (564)       \$ (350)       \$ (60)       \$ 660       \$ 1,020         11       Daily % Total       15%       16%       19%       24%       27%         12       AVERAGE(B8:F8)         14       Extense the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.         19       OK       Cancel         20       OK       Cancel         21       OK       Cancel         23       OK       Cancel		Amityville	<u>s</u>								s					
7       Franklin Square       \$ 500 \$ 675 \$ 700 \$ 1,250 \$ 1,196 \$ 4,321 33%         8       Daily Total       \$ 1,936 \$ 2,150 \$ 2,450 \$ 3,160 \$ 3,520 \$ \$ 13,215         9       Increment       \$ 214 \$ 300 \$ 710 \$ 360         10       Actual vs. Target       \$ (564) \$ (350) \$ (50) \$ 660 \$ 1,020         11       Daily % Total       15% 16% 19% 24% 27%         12			\$	735			•									
9       Increment       \$ 214 \$ 300 \$ 710 \$ 360         10       Actual vs. Target       \$ (564) \$ (350) \$ (50) \$ 660 \$ 1,020         11       Daily % Total       15%         12       16       Image: Second	7	Franklin Square	\$	500	\$	675	\$	700	\$		\$	1,196	\$	4,321	33%	
10       Actual vs. Target       \$ (564) \$ (350) \$ (50) \$ 660 \$ 1,020         11       Daily % Total       15%       16%       19%       24%       27%         12       13       AVERAGE       Image: Second	8	Daily Total	\$	1,936	\$	2,150	\$	2,450	\$	3,160	\$	3,520	\$	13,215		
11       Daily % Total       15%       16%       19%       24%       27%         12       III       AVERAGE       IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	9	Increment			\$	214	\$	300	\$		\$					
12       13         13       AVERAGE         14       Number1 B8:F8         15 =AVERAGE(B8:F8)       Image: a straight of the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.         16       = 2643.052         17       = 2643.052         18       arrays, or references that contain numbers.         19       Number1: number1, number2, are 1 to 30 numeric arguments for which you want the average.         21       Image: a straight of the average.         22       Formula result = 2643.052       OK         23       Cancel			\$	· · ·	\$	· · ·	\$	· · ·	\$		\$					
13       AVERAGE         14       Number1 B8:F8       = {1935.71,2150,245(         15       =AVERAGE(B8:F8)       Number2       = number         16       = 2643.052         17       = 2643.052         18       arrays, or references that contain numbers.         19       Number1: number1, number2, are 1 to 30 numeric arguments for which you want the average.         21       Pormula result = 2643.052       OK         22       23       OK       Cancel		Daily % Total		15%		16%		19%		24%		27%				
14       Number1       B8:F8       Image: Sector of the average of the average of the average.         16       = 2643.052         17       = 2643.052         18       = 2643.052         19       Number1: number1: number2, are 1 to 30 numeric arguments for which you want the average.         20       Image: Sector of the average of the average.         21       Image: Sector of the average.         22       Image: Sector of the average.         23       Image: Sector of the average.						AVERAGE	:									
16     = 2643.052       17     = 2643.052       18     Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.       19     Number1: number1: number2, are 1 to 30 numeric arguments for which you want the average.       21     Image: Control of the second s						N	Number1 88:F8									
17     = 2643.052       18     Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.       19     Number1: number1, number2, are 1 to 30 numeric arguments for which you want the average.       21     Image: Control of the average       22     Image: Control of the average       23     Image: Control of the average	15	=AVERAGE(B8:F8)					Number2									
17     Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.       19     Number1, number1, number2, are 1 to 30 numeric arguments for which you want the average.       21     Image: Content of the average in the average in the average in the average.       22     Image: Content of the average in the average in the average in the average.       23     Image: Content of the average in the average.							,									
10     arrays, or references that contain numbers.       19     Number1: number1, number2, are 1 to 30 numeric arguments for which you want the average.       21     ?       22     Formula result = 2643.052       23     OK																
20     The average.       21     Image: Concel       22     Image: Concel       23     Image: Concel						arrays, or references that contain numbers.										
21         Image: Pormula result = 2643.052         OK         Cancel           23         23         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24         24						N										
22						2	Formula result = 2643.052     OK Cancel									
K ← ▶ M / Raw Data \ Finished / Finished Charts /																
Point	Poir	nt													NUM	

### **AVERAGE Function**

If, in our spreadsheet above, we wanted the average of the daily totals, we could use the formula:

#### =(B8+C8+D8+E8+F8)/5

But, imagine how tedious this would be if we had a hundred numbers to average! Instead, we could use the **AVERAGE** function. The Function Wizard for the AVERAGE function is shown in the above figure. There's two ways to fill in the values to average:

- Position the cursor in the box for Number1 and either click on cell B8 or type "B8." Then click in the box for Number2 and click on — or type in — "C8." Notice that when you clicked in the box for Number2, a third box appeared for Number3. This will repeat itself for as many values that you add. But, this is just as long as typing in the long formula above. Of course, there's an easier way....
- 2. Starting over, click in the box for **Number1**. Then select the range of cells that make up the numbers you wish to average. As illustrated in the figure above, click-and-hold on cell B8 and drag across to cell F8. Now let go of the mouse button and the range B8:F8 should be in the Number1 box.

When you click the OK button, your AVERAGE formula will be evaluated.

#### The A-factor

There's also another function in the Function Library called **AVERAGEA**. The difference between AVERAGE and AVERAGEA is that if you specify a range of cells, as we did in the second example, AVERAGE will ignore any text or non-numeric cell contents where AVERAGEA will consider them as zero entries.

# **Microsoft Excel – Function Library**

Microsoft Excel - Book3     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help     File Edit View Insert Format Tools Data Window Help
Arial       IO       B       ID       E       F       G       H       J       K         PMT       X       = =PMT(B3,B4,B5,B6,B7)         A       B       C       D       E       F       G       H       J       K         1       .       X       = =PMT(B3,B4,B5,B6,B7)       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .       .
Arial       ID       B       Z       II       II       J       K         PMT       X       I       II       II       J       K       III         A       B       C       D       E       F       G       H       I       J       K         1       III       IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
PMT       X       I = PMT(B3,B4,B5,B6,B7)         A       B       C       D       E       F       G       H       I       J       K         1       2
A       B       C       D       E       F       G       H       I       J       K         1       1       2       1       5       60       convert any annual interest to monthly       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 </td
1       2         3       Interest Rate/12       1.50% convert any annual interest to monthly         4       Term * 12       60         5       Amount to Borrow       \$ 25,000         6       Final Value       usually zero         7       Type       1=beginning of month; 0=end of month         9       10       Total Payback       (\$38,090.14)         11       11       11       11         12       0       PMT       12         14       14       14       14
3       Interest Rate/12       1.50%       convert any annual interest to monthly         4       Term * 12       60       total number of payments         5       Amount to Borrow       \$ 25,000       usually zero         6       Final Value       usually zero         7       Type       1=beginning of month; 0=end of month         9       1=beginning of month; 0=end of month         9       10       Total Payback       (\$38,090.14)         11
4       Term * 12       60       total number of payments         5       Amount to Borrow       \$ 25,000         6       Final Value       usually zero         7       Type       1=beginning of month; 0=end of month         8       Monthly Payment       i3,B4,B5,B6,B7)         9       9       -         10       Total Payback       (\$38,090.14)         11       -       -         12       -       -         13       -       -         14       -       -
5       Amount to Borrow       \$ 25,000         6       Final Value       usually zero         7       Type       1=beginning of month; 0=end of month         8       Monthly Payment       3,B4,B5,B6,B7)         9       9         10       Total Payback       (\$38,090.14)         11       -         12       -         13       -         14       -
6       Final Value       usually zero         7       Type       1=beginning of month; 0=end of month         8       Monthly Payment       i3,B4,B5,B6,B7)         9       9         10       Total Payback       (\$38,090.14)         11       11         12       Monthly Payment         13       9         14       9
7     Type     1=beginning of month; 0=end of month       8     Monthly Payment     i3,B4,B5,B6,B7)     PMT       9     10     Total Payback     (\$38,090.14)       10     Total Payback     (\$38,090.14)       11     PMT       12     Sector       13     Per B4       14     Sector
9     10     Total Payback     (\$38,090.14)       11     11       12     Nper B4       13     PV B5       14     Solo
10     Total Payback     (\$38,090.14)       11     Rate     33       12     Nper       13     PV       14     SS
11     Rate 33     = 0.015       12     Nper B4     = 60       13     Pv B5     = 25000       14     Fractional State
12         Nper         B4         Size         = 60           13         Pv         B5         Size         = 25000           14         Fix         Fix         Fix         = 0
15         ™   66         ≤ = 0           16         Type   87         ≤ = 0
17
18 Calculates the payment for a loan based on constant payments and a constant interest rate.
19
20     Rate is the interest rate per period for the loan.       21
22 Formula result = (\$634.84) OK Cancel
24
25  ◀ ◀ ▶ ▶  Sheet1 / Sheet2 / Sheet3 /

## **PAYMENT Function**

Since spreadsheet programs, like Excel, were created to originally help financial applications (Accountants, Analysts, etc.), the Function Library is stuffed with many complex financial formulas. Their parameters are entered similarly. To illustrate, we will examine the *Payment* function, PMT.

Refer to the figure above and enter the text in the A column, and only the values in B3, B4 and B5. Now click on B8 and call up the *Function Library*. Choose the *Financial* category and select PMT from the function list.

Rate is the interest rate for the loan.
Nper is the total number of payments for the loan.
Pv is the present value, or the total amount that a series of future payments is worth now; also known as the principal.
Fv is the future value, or a cash balance you want to attain after the last payment is made. If Fv is omitted, it is assumed to be 0 (zero), that is, the future value of a loan is 0.
Type is the number 0 (zero) or 1 and indicates when payments are due (0 or omitted = At the end of the period; 1 = the beginning of the period

Make sure that you are consistent about the units you use for specifying **Rate** and **Nper**. If you make monthly payments on a five-year loan at an annual interest rate of 12 percent, use 12%/12 for rate and 5\*12 (or 60) for **Nper**. If you make annual payments on the same loan, use 12 percent for rate and 5 for **Nper**.

To find the total amount paid over the duration of the loan, multiply the returned **PMT** value by **Nper**. Put this formula in cell B10.

You don't have to use the Function Wizard; you could type in the formula — even specifying cell ranges by the click-and-drag method.

#### Other Functions

Here's a brief list of some of popular functions you may want to employ. Two of which we have already looked at in detail.

=NOW()	-Returns today's date
=AVERAGE()	-Returns the average of a range
=MIN()	-Returns the smallest value in a range
=MAX()	-Returns the largest value in a range
=COUNT()	-Returns the numbers of items in a list
=PMT()	-Returns the monthly payment for an amount borrowed
=ROUND()	-Rounds of decimal numbers to a specified number of significant digits
=DB()	-Returns the depreciation of an asset for a specified period using the fixed-declining balance method.
=DDB()	-Returns the depreciation of an asset for a specified period using the double-declining balance method or some other method you specify.
=POWER()	-Returns the result of a number raised to a power.
=LOWER()	-Converts all uppercase letters in a text string to lowercase.
=UPPER()	-Converts text to uppercase.
=VALUE()	-Converts a text string that represents a number to a number.

Whether you use functions or formulas, if it needs to be applied to more than one row or column, you do not have to type in the formula every time. You can use the fill method to copy formulas.