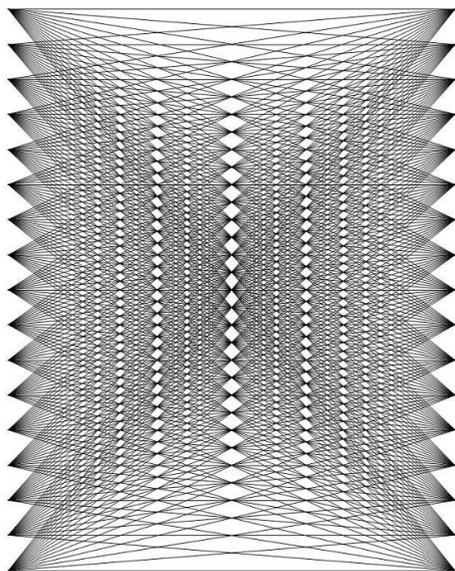


LINE DESIGNS and OBJECT DRAWING

Scatter plots (with and without connecting the points) and conditional formatting are two powerful methods for doing things in Excel. I want to briefly touch on a third I use a lot, and that's the "line draw / object draw" method. A simple example:



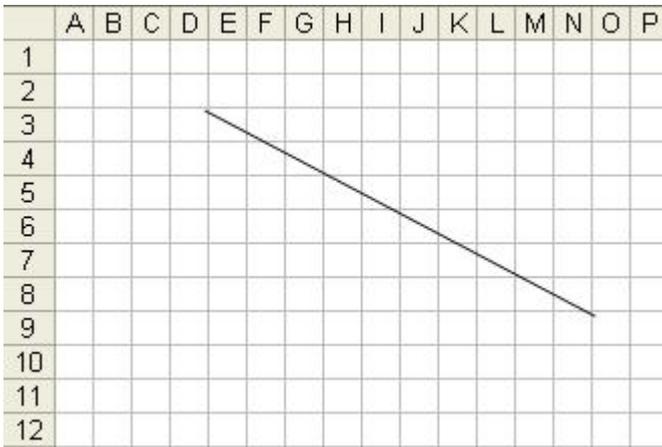
Getting Started

What is going on here? How do I even get started? Like many things already mentioned, to get an idea of what is going on, simply turn on "Macro Record", draw a line, and see what Excel is actually doing.

How?

1. In Vista, Click on the “Developer” tab;
2. Select “Record Macro”;
3. Click on “OK”;
4. Do something – if you want to see how Excel draws a line, draw a line. If you want to see how Excel copies and pastes, copy and paste something. When you’re done ...
5. Select “Stop Recording”;
6. To see what Excel has done, select the “Macro” button to the far left, and it shows all the macros you’ve created. Click on the one you just created.

For example: I turn on the “Record Macro” option, and draw a line ...



The image shows a portion of an Excel spreadsheet with columns labeled A through P and rows labeled 1 through 12. A diagonal line is drawn across the grid, starting at the intersection of column E and row 3, and extending to the intersection of column O and row 8.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																

And Excel records this:

```
Sub Macro12()  
,
```

```
' Macro12 Macro
```

```
' Macro recorded 12/10/2008 by Mike Round
```

```
"
```

```
    ActiveSheet.Shapes.AddLine(56.25, 27#, 201#, 104.25).Select
```

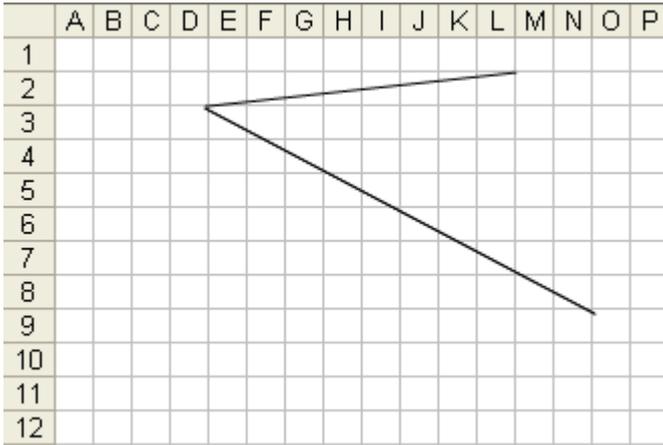
```
End Sub
```

Actually – sadly – in the new version of Excel (Vista), the macro does not record this – when you use the “shapes” option. It’s a glitch. We’ll find a way around it. But back to the macro. First, get rid of all the junk:

```
Sub Macro12()  
    ActiveSheet.Shapes.AddLine(56.25, 27#, 201#, 104.25).Select
```

```
End Sub
```

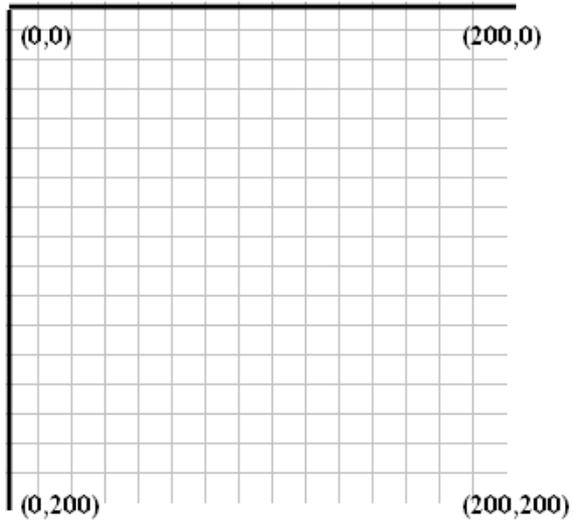
What do these numbers mean? Let’s draw another one and see if we can figure it out:



Sub Macro14()

```
ActiveSheet.Shapes.AddLine(56.25, 26.25, 171.75, 13.5).Select
End Sub
```

As the first two hardly changed (except for my unsteady mouse), they refer to the starting coordinates of the line. The last two must be the ending coordinates. As the numbers are lower in the upper left section of the grid, the layout of the grid – the coordinate system, if you will – must look as follows:



and the “addline” method contains four points, relating to the start and end of the line. The syntax is:

```
addline(start x, start y, end x, end y)
```

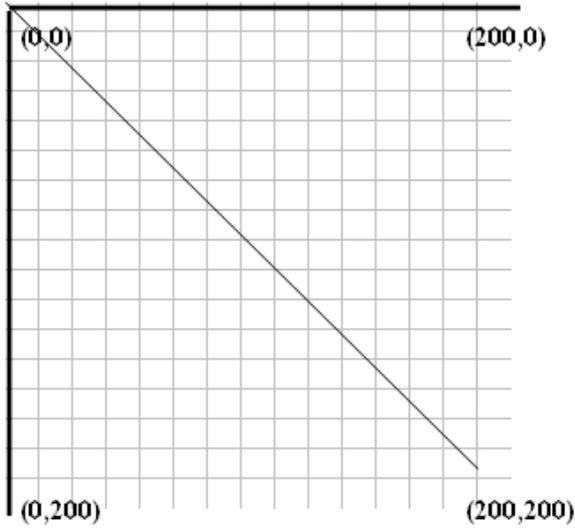
Let’s check to see if our reasoning is right. I want to draw a line from the upper left to the lower right, with coordinates:

(0,0) to (200,200).

```
Sub Macro14()
```

```
    ActiveSheet.Shapes.AddLine(0,0, 200, 200).Select
```

```
End Sub
```



And it works! What would 100 random lines look like? A note: in Excel programming language, the “random” function is a bit different than when using the spreadsheet. In the programming language, the randomize function is: `RND()`

I want the starting and ending points to all randomly be between 0 and 100:

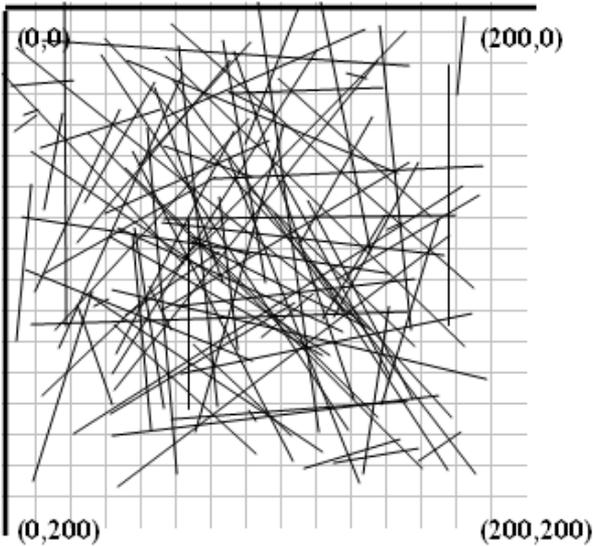
```
Sub Macroxx()
```

```
For xxx = 1 To 100
```

```
    ActiveSheet.Shapes.AddLine(200 * Rnd(), 200 * Rnd(), 200 *  
    Rnd(), 200 * Rnd()).Select
```

```
Next xxx
```

```
End Sub
```



OK ... now let's structure some things. But before we get started, there's a little problem of *removing* all the lines drawn.

I've found only one way. If you find another, let me know:

Using the pull down menus:

Select [edit]

Select [goto]

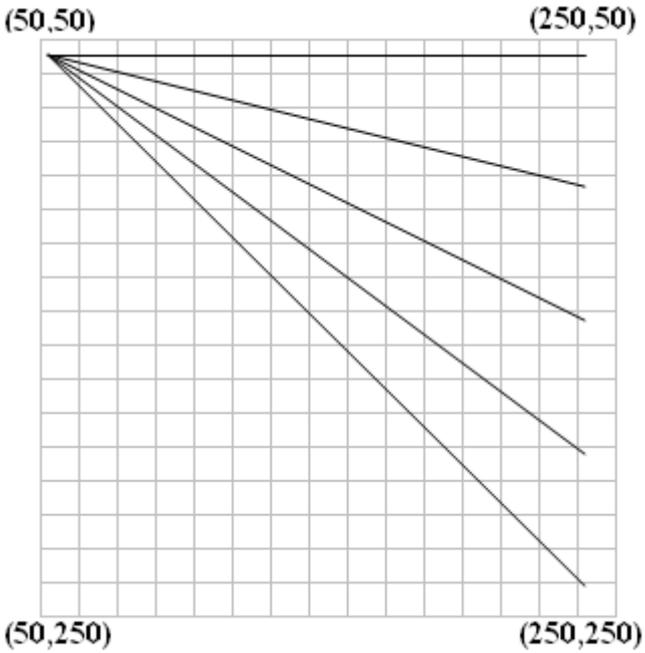
Click on [special]

Click on [objects]

This selects all of the drawn objects at one time. Then push the [delete] key.

Getting Started

To get started, let's create the following:



We've got the basic structure from our previous work so let's hazard a guess as to how to proceed. Here's my first guess:

```
Sub Macrotry1()
```

```
    ActiveSheet.Shapes.AddLine(50, 50, 250, 50).Select  
    ActiveSheet.Shapes.AddLine(50, 50, 250, 100).Select  
    ActiveSheet.Shapes.AddLine(50, 50, 250, 150).Select  
    ActiveSheet.Shapes.AddLine(50, 50, 250, 200).Select  
    ActiveSheet.Shapes.AddLine(50, 50, 250, 250).Select
```

```
End Sub
```

A Second Try

Though the macro works, it also looks a bit cumbersome. Let's clean it up a bit. Instead of repeating all of the lines, let's look at what's changing in each: just one number. And we see how it's changing. It's changing by 50. We see it happens 5 times.

With all of that information, let's modify our macro:

```
Sub Macrotry2()
```

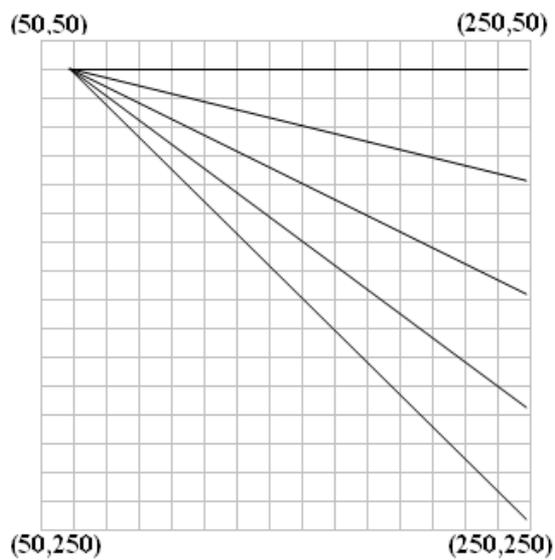
```
For yyy = 1 To 5
```

```
    endy = 50 * yyy
```

```
    ActiveSheet.Shapes.AddLine(50, 50, 250, endy).Select
```

```
Next yyy
```

```
End Sub
```

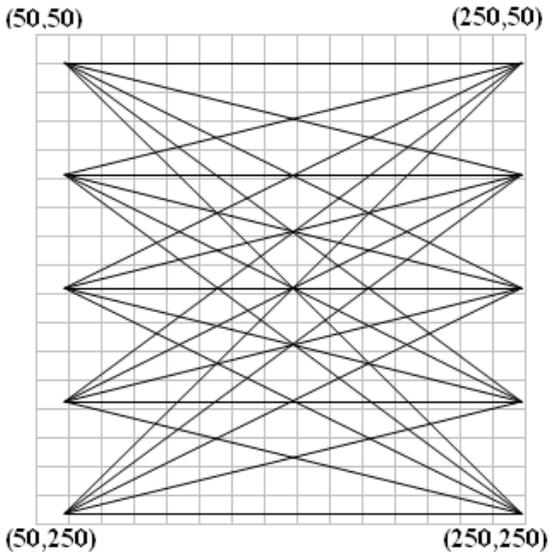


A Third Try

Awesome! We're almost there! After we connect these five lines, what happens next? I drop down one point and repeat the process. That is, my "starting y" changes.

So, we want to wrap another "for / next" loop around our current loop. Let's see:

```
Sub Macrotry3()  
For xxx = 1 To 5  
For yyy = 1 To 5  
    starty = 50 * xxx  
    endy = 50 * yyy  
    ActiveSheet.Shapes.AddLine(50, starty, 250, endy).Select  
Next yyy  
Next xxx  
End Sub
```



A Fourth Try

It seems like we're done. In fact, we are! Of course, you can play around with this lots of ways – more points, bigger, smaller, etc.

Let's suppose, however, I'm having trouble with the for-next loops. I'm having trouble writing the macro. I know all the coordinates, but the program won't work. What to do?

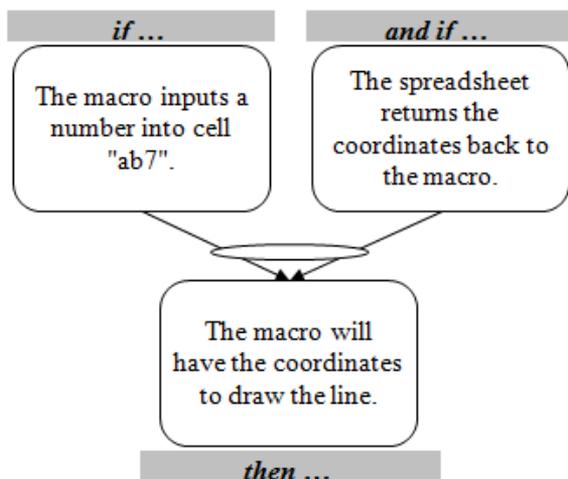
First, do I know all the points?

In a spreadsheet, this is a test. In this case, it's easy. 25 lines in the above graphic, and here are the coordinates for all of them:

If I could just get the macro to recognize these points, I'd be home-free. Let's do it.

Let's create a separate section, called our "lookup section", for which we want our macro to concentrate on. Above, we talked about the "vlookup" function. What I want it to do is take a given number, and find all the coordinates for that "number".

line	starting		ending	
	x	y	x	y
1	50	50	250	50
2	50	50	250	100
3	50	50	250	150
4	50	50	250	200
5	50	50	250	250
6	50	100	250	50
7	50	100	250	100
8	50	100	250	150
9	50	100	250	200
10	50	100	250	250
11	50	150	250	50
12	50	150	250	100
13	50	150	250	150
14	50	150	250	200
15	50	150	250	250
16	50	200	250	50
17	50	200	250	100
18	50	200	250	150
19	50	200	250	200
20	50	200	250	250
21	50	250	250	50
22	50	250	250	100
23	50	250	250	150
24	50	250	250	200
25	50	250	250	250



	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM
4			MY LOOKUP TABLE					MY TABLE OF DATA						
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														
30														
31														
--														

How do we do this? How do we read numbers into cell ab7? How do we get the macro to recognize the values in cells AC7:AF7?

Cell “AB7” is the key. What I want the macro to do is put a number here, my “looping number”. My loop now goes from 1 to 25.

```
Sub Macrotry5()
```

```
For zzz = 1 To 25
```

```
    Range("ab7").Value = zzz
```

```
    Calculate
```

```
    startx = Range("ac7").Value
```

```
    starty = Range("ad7").Value
```

```
    endx = Range("ae7").Value
```

```
    endy = Range("af7").Value
```

```
    ActiveSheet.Shapes.AddLine(startx, starty, endx, endy).Select
```

```
Next zzz
```

```
End Sub
```

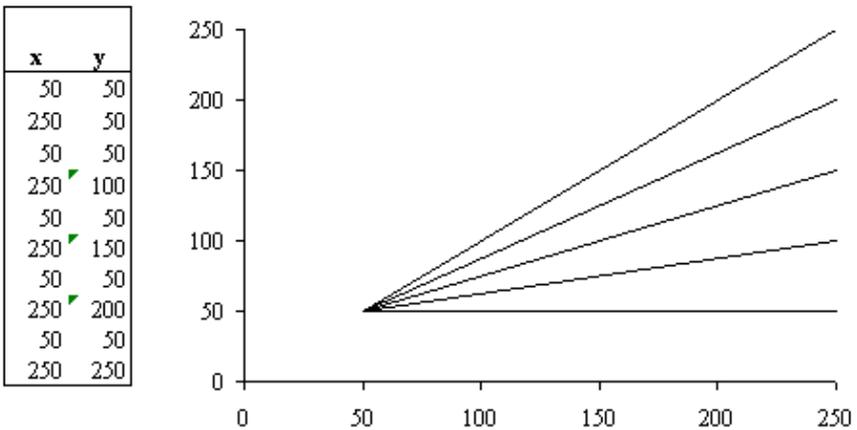
I find this method particularly helpful when the coordinates may not be as simple to calculate in a macro, but I can easily calculate them in the spreadsheet itself.

A Fifth Try

There are many ways to skin a cat. A macro. A spreadsheet that inputs data to the macro. What about our scatter plot? Will that work?

Of course, when you realize this is just points being connected by lines.

Also, it takes a bit more work to create the graph in one series, because once the line is drawn, it has to go back to where it started to draw a new line.



Bothersome? Hardly. Exciting, because I have another method to visualize data.

Your Assignment

Create the following three graphics:

