

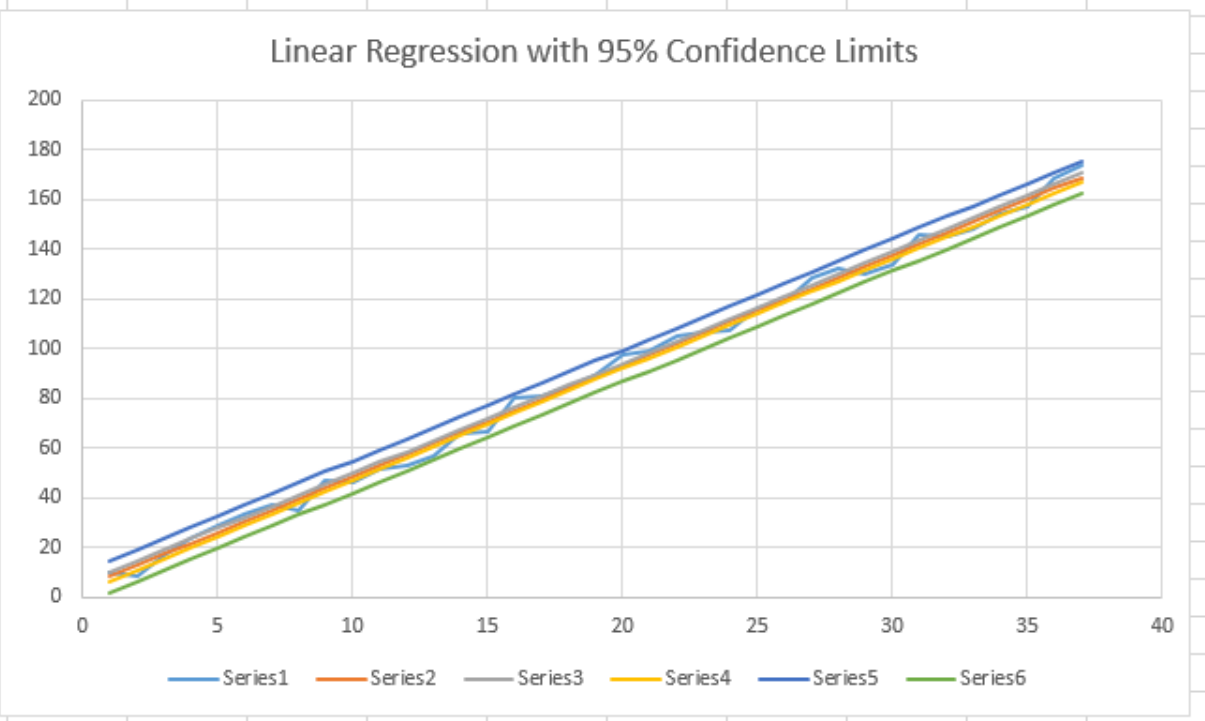
Determining Limit of Detection

Using the LS Spreadsheet

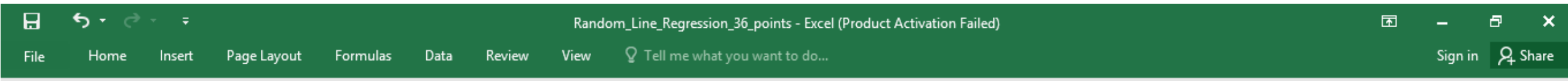
Replace the dependent variable in A1 (x-value) by 0

A1 1

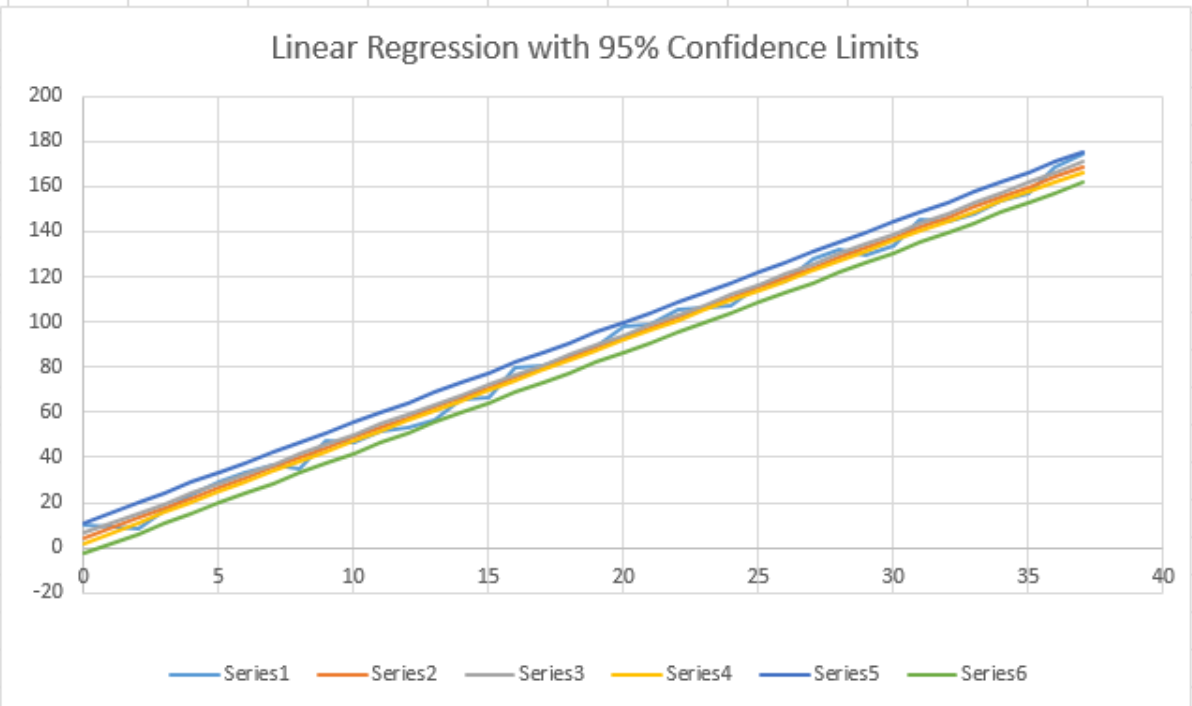
1	1	9.79082	8.259052	10.30287	6.21523	14.84393	1.674176	18.5	16206
2	2	8.62529	12.71771	14.67584	10.75957	19.27649	6.158919		
3	3	16.5963	17.17636	19.05027	15.30245	23.7105	10.64222	4.458654	3.800398
4	4	23.3523	21.63501	23.42637	19.84365	28.14595	15.12407	0.049417	1.048495
5	5	28.7823	26.09367	27.80439	24.38295	32.58289	19.60445	0.995841	3.080172
6	6	33.6737	30.55232	32.1846	28.92004	37.0213	24.08334	8140.451	34
7	7	36.9429	35.01098	36.56734	33.45461	41.46122	28.56073	77232.22	322.5737
8	8	34.6222	39.46963	40.953	37.98626	45.90265	33.03661	2.032245	
9	9	47.212	43.92828	45.34203	42.51454	50.34561	37.51096		
10	10	46.5106	48.38694	49.73495	47.03893	54.7901	41.98377		
11	11	51.8485	52.84559	54.13235	51.55883	59.23614	46.45504		
12	12	53.3597	57.30424	58.53492	56.07357	63.68374	50.92475		
13	13	56.6882	61.7629	62.94337	60.58242	68.1329	55.3929		
14	14	65.6857	66.22155	67.35851	65.0846	72.58363	59.85947		
15	15	66.5158	70.68021	71.78111	69.57931	77.03594	64.32447		
16	16	79.8204	75.13886	76.21192	74.0658	81.48983	68.78789		
17	17	80.6063	79.59751	80.65161	78.54342	85.94531	73.24972		
18	18	84.4662	84.05617	85.10065	83.01168	90.40237	77.70996		
19	19	89.0918	88.51482	89.55931	87.47034	94.86103	82.16862		
20	20	97.7157	92.97348	94.02757	91.91938	99.32127	86.62568		
21	21	98.7081	97.43213	98.50519	96.35907	103.7831	91.08116		
22	22	105.175	101.8908	102.9917	100.7899	108.2465	95.53505		
23	23	106.706	106.3494	107.4864	105.2125	112.7115	99.98736		
24	24	107.395	110.8081	111.9886	109.6276	117.1781	104.4381		
25	25	116.599	115.2667	116.4974	114.0361	121.6462	108.8873		
26	26	118.297	119.7254	121.0122	118.4386	126.1159	113.3348		



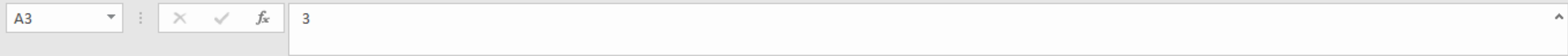
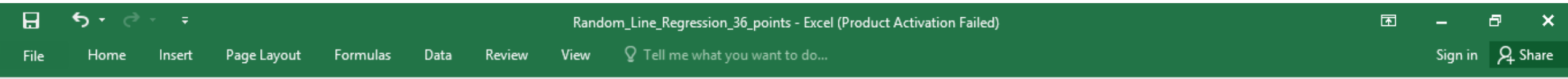
Since the formulae are still in place it calculates the 95% limits



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	
1	0	9.79082	4.319481	6.540593	2.098368	11.24087	-2.60191	18.47222	16205													
2	2	8.62529	13.194	15.23541	11.15258	20.05983	6.328164															
3	3	16.5963	17.63125	19.58504	15.67747	24.47154	10.79096	4.437258	4.319481													
4	4	23.3523	22.06851	23.93643	20.2006	28.88477	15.25225	0.051514	1.092936													
5	5	28.7823	26.50577	28.28982	24.72172	33.29953	19.71201	0.995439	3.225657													
6	6	33.6737	30.94303	32.64553	29.24053	37.71583	24.17023	7419.706	34													
7	7	36.9429	35.38029	37.00389	33.75668	42.13368	28.62689	77201.03	353.7654													
8	8	34.6222	39.81754	41.36531	38.26978	46.55311	33.08198	2.032245														
9	9	47.212	44.2548	45.73027	42.77934	50.97412	37.53548															
10	10	46.5106	48.69206	50.0993	47.28481	55.39673	41.98739															
11	11	51.8485	53.12932	54.47304	51.78559	59.82094	46.43769															
12	12	53.3597	57.56658	58.85218	56.28098	64.24677	50.88638															
13	13	56.6882	62.00383	63.23747	60.7702	68.67423	55.33344															
14	14	65.6857	66.44109	67.62974	65.25245	73.10331	59.77887															
15	15	66.5158	70.87835	72.02979	69.72691	77.53403	64.22267															
16	16	79.8204	75.31561	76.4384	74.19282	81.96639	68.66482															
17	17	80.6063	79.75287	80.85624	78.64949	86.4004	73.10533															
18	18	84.4662	84.19012	85.28379	83.09645	90.83605	77.54419															
19	19	89.0918	88.62738	89.72133	87.53343	95.27336	81.9814															
20	20	97.7157	93.06464	94.16884	91.96044	99.71231	86.41697															
21	21	98.7081	97.5019	98.62604	96.37775	104.1529	90.85088															
22	22	105.175	101.9392	103.0924	100.7859	108.5952	95.28315															
23	23	106.706	106.3764	107.5674	105.1855	113.039	99.71378															
24	24	107.395	110.8137	112.05	109.5773	117.4846	104.1428															
25	25	116.599	115.2509	116.5396	113.9623	121.9317	108.5701															
26	26	118.297	119.6882	121.0353	118.3411	126.3805	112.9959															



Change the value in A2 until the lower limit equals the upper limit

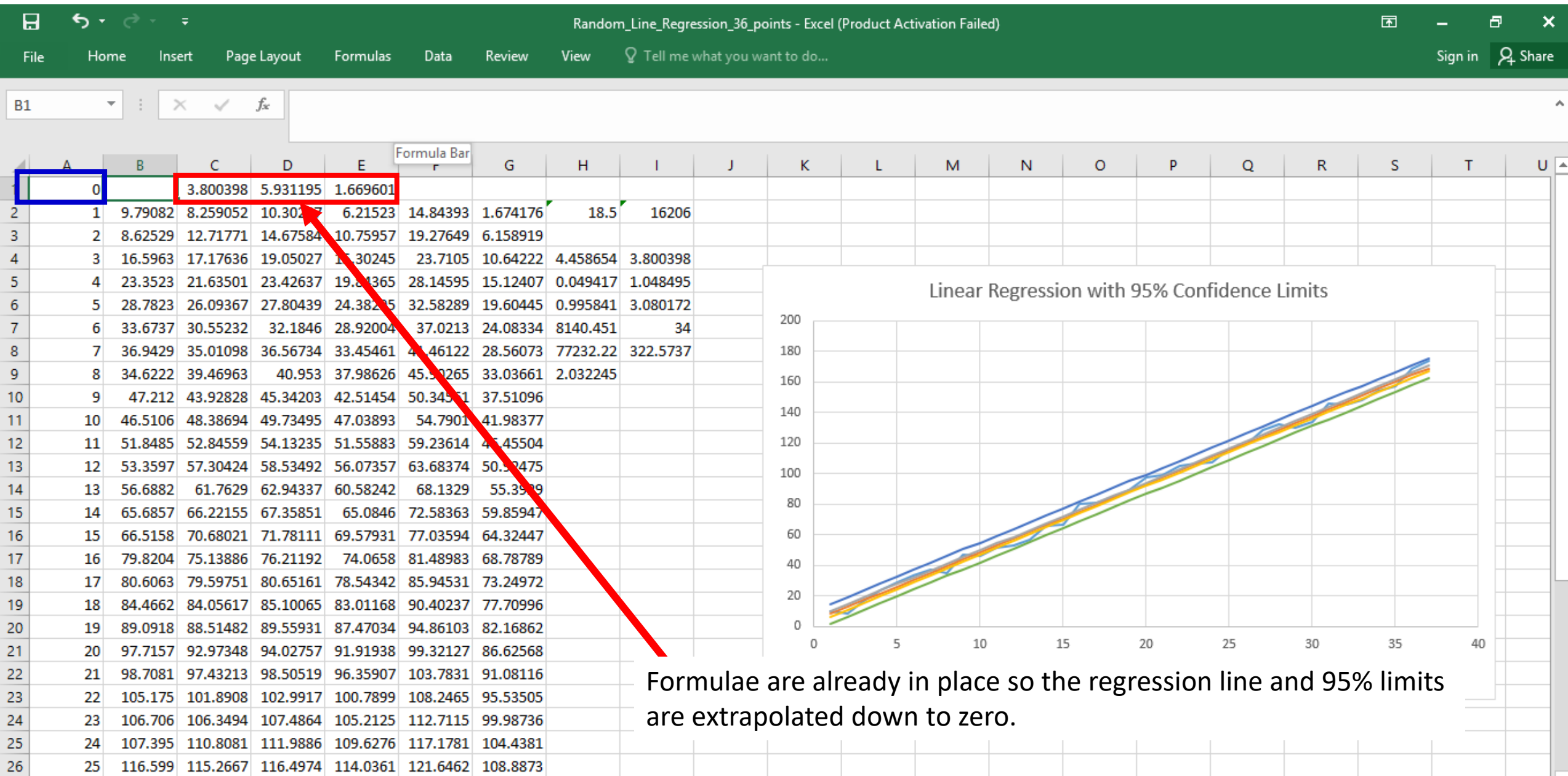


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	0	9.79082	4.806446	6.944383	2.668509	11.49634	-1.88345	18.44306	16201.9												
2	0.95	8.62529	9.003424	11.05867	6.948174	5.66735	2.339494														
3	3	17.5963	18.06006	19.9411	16.17902	24.67234	11.44778	4.417871	4.806446												
4	4	23.3513	22.47793	24.27649	20.67938	29.06722	15.88864	0.049589	1.052008												
5	5	28.7823	26.8958	28.61382	25.17779	33.46357	20.32804	0.995734	3.11925												
6	6	33.6737	31.3267	32.95339	29.67395	37.86139	24.76596	7936.918	34												
7	7	36.9429	35.73153	37.29555	34.16755	42.26071	29.20238	77223.99	330.8105												
8	8	34.6222	40.14942	41.54066	38.65817	46.66154	33.6373	2.032245													
9	9	47.212	44.56729	45.98531	43.14537	51.06389	38.07069														
10	10	46.5106	48.98516	50.3417	47.62862	55.46776	42.50256														
11	11	51.8485	53.40303	54.69874	52.10732	59.87318	46.93289														
12	12	53.3597	57.8209	59.061	56.5808	64.28014	51.36167														
13	13	56.6882	62.23877	63.4292	61.04835	68.68866	55.78889														
14	14	65.6857	66.65665	67.80413	65.50917	73.09174	60.21455														
15	15	66.5158	71.07452	72.18655	69.96249	77.5104	64.63864														
16	16	79.8204	75.49239	76.57721	74.40757	81.92362	69.16116														
17	17	80.6063	79.91026	80.97674	78.84379	86.33842	73.482														
18	18	84.4662	84.32813	85.38559	83.27068	90.75481	77.90146														
19	19	89.0918	88.746	89.80401	87.688	95.17277	82.31924														
20	20	97.7157	93.16388	94.23198	92.09577	99.59231	86.73544														
21	21	98.7081	97.58175	98.66923	96.49426	104.0134	91.15006														
22	22	105.175	101.9996	103.1153	100.884	108.4361	95.56311														
23	23	106.706	106.4175	107.5695	105.2655	112.8604	99.97458														
24	24	107.395	110.8354	112.0311	109.6396	117.2862	104.3845														
25	25	116.599	115.2532	116.4994	114.0071	121.7136	108.7928														
26	26	118.297	119.6711	120.9735	118.3687	126.1426	113.1996														



This value was changed until the lower limit was equal to the Upper limit. This is equivalent to a horizontal line across both Limits. Therefore, 0.95 is the limit of detection for this data set.

Alternative approach: add a row above the data, input zero



Formulae are already in place so the regression line and 95% limits are extrapolated down to zero.

Delete the y-data (column B) just to make it easier to see the result

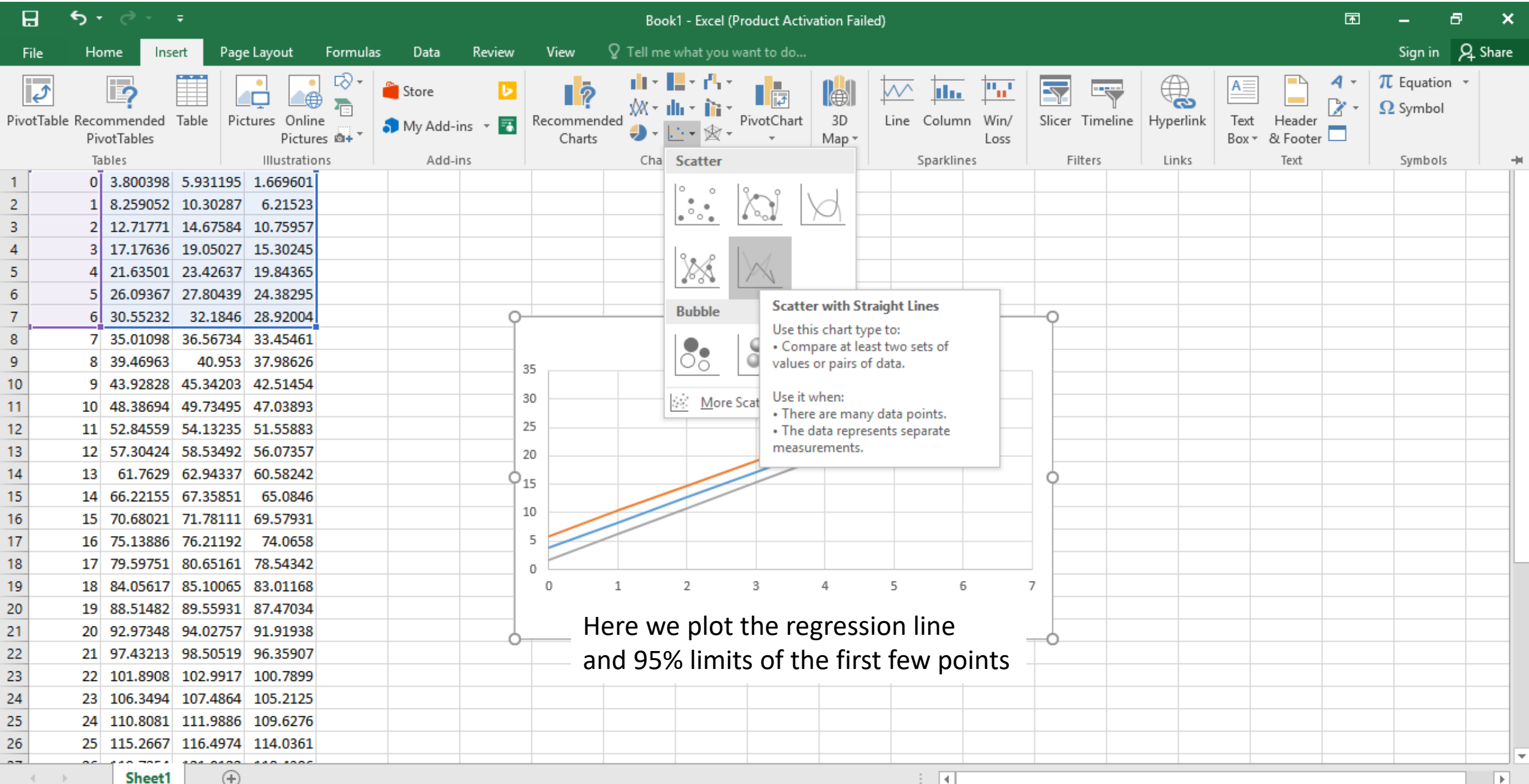
The screenshot shows the Microsoft Excel interface with a data table. The ribbon is set to 'Home'. The 'Delete' button in the 'Cells' group is active, and its dropdown menu is open, showing the following options:

- Delete Cells...
- Delete Sheet Rows
- Delete Sheet Columns (highlighted)
- Delete Sheet

The data table contains the following values:

	A	B	C	D	E
1	0	3.800398	5.931195	1.669601	
2	1	9.79082	8.259052	10.30287	6.21523
3	2	8.62529	12.71771	14.67584	10.75957
4	3	16.5963	17.17636	19.05027	15.30245
5	4	23.3523	21.63501	23.42637	19.84365
6	5	28.7823	26.09367	27.80439	24.38295
7	6	33.6737	30.55232	32.1846	28.92004
8	7	36.9429	35.01098	36.56734	33.45461
9	8	34.6222	39.46963	40.953	37.98626
10	9	47.212	43.92828	45.34203	42.51454
11	10	46.5106	48.38694	49.73495	47.03893
12	11	51.8485	52.84559	54.13235	51.55883
13	12	53.3597	57.30424	58.53492	56.07357
14	13	56.6882	61.7629	62.94337	60.58242
15	14	65.6857	66.22155	67.35851	65.0846
16	15	66.5158	70.68021	71.78111	69.57931
17	16	79.8204	75.13886	76.21192	74.0658
18	17	80.6063	79.59751	80.65161	78.54342
19	18	84.4662	84.05617	85.10065	83.01168
20	19	89.0918	88.51482	89.55931	87.47034
21	20	97.7157	92.97348	94.02757	91.91938
22	21	98.7081	97.43213	98.50519	96.35907
23	22	105.175	101.8908	102.9917	100.7899
24	23	106.706	106.3494	107.4864	105.2125
25	24	107.395	110.8081	111.9886	109.6276
26	25	116.599	115.2667	116.4974	114.0361

Use a scatter plot with straight lines to plot B, C and D vs A



	A	B	C	D
1	0	3.800398	5.931195	1.669601
2	1	8.259052	10.30287	6.21523
3	2	12.71771	14.67584	10.75957
4	3	17.17636	19.05027	15.30245
5	4	21.63501	23.42637	19.84365
6	5	26.09367	27.80439	24.38295
7	6	30.55232	32.1846	28.92004
8	7	35.01098	36.56734	33.45461
9	8	39.46963	40.953	37.98626
10	9	43.92828	45.34203	42.51454
11	10	48.38694	49.73495	47.03893
12	11	52.84559	54.13235	51.55883
13	12	57.30424	58.53492	56.07357
14	13	61.7629	62.94337	60.58242
15	14	66.22155	67.35851	65.0846
16	15	70.68021	71.78111	69.57931
17	16	75.13886	76.21192	74.0658
18	17	79.59751	80.65161	78.54342
19	18	84.05617	85.10065	83.01168
20	19	88.51482	89.55931	87.47034
21	20	92.97348	94.02757	91.91938
22	21	97.43213	98.50519	96.35907
23	22	101.8908	102.9917	100.7899
24	23	106.3494	107.4864	105.2125
25	24	110.8081	111.9886	109.6276
26	25	115.2667	116.4974	114.0361

Read off the limit of detection graphically or by interpolation
 Using the calculated values in columns C and D.
 We see it is about 0.95 when we do it this way as well.

