

Implementing FFT in Excel

You can do this using the menu tools in Excel

It is an alternative to the Macro developed for the class

C1 :    =COS(B1*4)

	A	B	C
1	1	0.012272	0.998795
2	2	0.024544	0.995185
3	3	0.036816	0.989177
4	4	0.049087	0.980785
5	5	0.061359	0.970031
6	6	0.073631	0.95694
7	7	0.085903	0.941544
8	8	0.098175	0.92388
9	9	0.110447	0.903989
10	10	0.122718	0.881921
11	11	0.13499	0.857729
12	12	0.147262	0.83147
13	13	0.159534	0.803208
14	14	0.171806	0.77301
15	15	0.184078	0.740951
16	16	0.19635	0.707107
17	17	0.208621	0.671559
18	18	0.220893	0.634393
19	19	0.233165	0.595699
20	20	0.245437	0.55557
21	21	0.257709	0.514103
22	22	0.269981	0.471397
23	23	0.282252	0.427555
24	24	0.294524	0.382683
25	25	0.306796	0.33689
26	26	0.319068	0.290285
27	27	0.33134	0.24298
28	28	0.343612	0.19509

Here I have created a cosine function just like you are asked to do in the lecture. I did not add any noise so this is a perfect cosine function of the range 0 to 2 Pi.

D1 : =COS(C1*4)
Calibri 11 A A \$ %

	A	B	C	D
1	1	0.012272	0.998795	
2	2	0.024544	0.995185	-0.6681
3	3	0.036816	0.989177	
4	4	0.049087	0.980785	
5	5	0.061359	0.970031	
6	6	0.073631	0.95694	
7	7	0.085903	0.941544	
8	8	0.098175	0.92388	
9	9	0.110447	0.903989	
10	10	0.122718	0.881921	
11	11	0.13499	0.857729	
12	12	0.147262	0.83147	
13	13	0.159534	0.803208	
14	14	0.171806	0.77301	
15	15	0.184078	0.740951	
16	16	0.19635	0.707107	
17	17	0.208621	0.671559	
18	18	0.220893	0.634393	
19	19	0.233165	0.595699	
20	20	0.245437	0.55557	
21	21	0.257709	0.514103	
22	22	0.269981	0.471397	
23	23	0.282252	0.427555	-0.13897
24	24	0.294524	0.382683	0.040052
25	25	0.306796	0.33689	0.221387
26	26	0.319068	0.290285	0.398295
27	27	0.33134	0.24298	0.563714
28	28	0.343612	0.19509	0.710659

Cut
 Copy
Paste Options:

Paste Special...
Insert...
Delete...
Clear Contents
 Quick Analysis
Filter
Sort
Insert Comment
Format Cells...
Pick From Drop-down List...
Define Name...
 Hyperlink...

Paste

Paste Values

Other Paste Options

Paste Special...

Now paste the numbers in column C into column D using the Paste Special option. You will select the Paste Values menu choice (left most icon). This means that column D just contains numbers with no references to the other columns.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	1	0.012272	0.998795	0.998795															
2	2	0.024544	0.995185	0.995185															
3	3	0.036816	0.989177	0.989177															
4	4	0.049087	0.980785	0.980785															
5	5	0.061359	0.970031	0.970031															
6	6	0.073631	0.95694	0.95694															
7	7	0.085903	0.941544	0.941544															
8	8	0.098175	0.92388	0.92388															
9	9	0.110447	0.903989	0.903989															
10	10	0.122718	0.881921	0.881921															
11	11	0.13499	0.857729	0.857729															
12	12	0.147262	0.83147	0.83147															
13	13	0.159534	0.803208	0.803208															
14	14	0.171806	0.77301	0.77301															
15	15	0.184078	0.740951	0.740951															
16	16	0.19635	0.707107	0.707107															
17	17	0.208621	0.671559	0.671559															
18	18	0.220893	0.634393	0.634393															
19	19	0.233165	0.595699	0.595699															
20	20	0.245437	0.55557	0.55557															
21	21	0.257709	0.514103	0.514103															
22	22	0.269981	0.471397	0.471397															
23	23	0.282252	0.427555	0.427555															
24	24	0.294524	0.382683	0.382683															
25	25	0.306796	0.33689	0.33689															
26	26	0.319068	0.290285	0.290285															
27	27	0.33134	0.24298	0.24298															
28	28	0.343612	0.19509	0.19509															

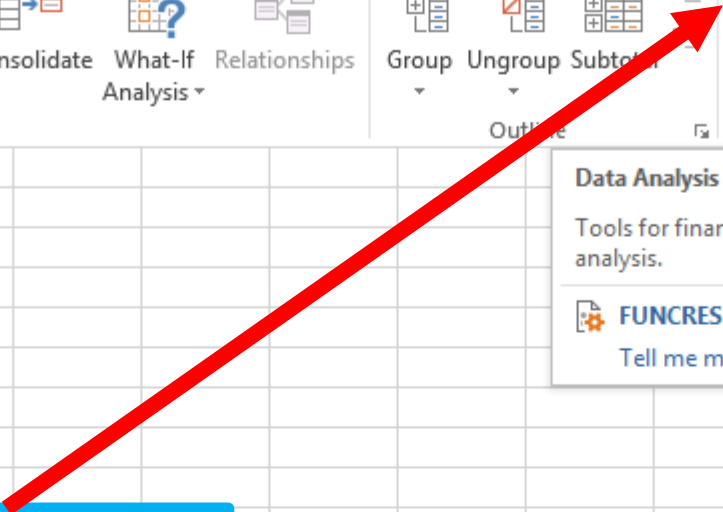
You can verify the column D is identical to column C. However, column C still has a formula associated with it. If you calculate the FFT on column C it will be very slow since it will need to recalculate the formula for each operation.

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW ACROBAT

From Access From Web From Text From Other Sources Existing Connections Refresh All Connections Sort Filter Text to Columns Flash Fill Remove Duplicates Data Validation Consolidate What-If Analysis Relationships Group Ungroup Subtotal Data Analysis Tools

2	2	0.024544	0.995185	0.995185
3	3	0.036816	0.989177	0.989177
4	4	0.049087	0.980785	0.980785
5	5	0.061359	0.970031	0.970031
6	6	0.073631	0.95694	0.95694
7	7	0.085903	0.941544	0.941544
8	8	0.098175	0.92388	0.92388
9	9	0.110447	0.903989	0.903989
10	10	0.122718	0.881921	0.881921
11	11	0.13499	0.857729	0.857729
12	12	0.147262	0.83147	0.83147
13	13	0.159534	0.803208	0.803208
14	14	0.171806	0.77301	0.77301
15	15	0.184078	0.740951	0.740951
16	16	0.19635	0.707107	0.707107
17	17	0.208621	0.671559	0.671559
18	18	0.220893	0.634393	0.634393
19	19	0.233165	0.595699	0.595699
20	20	0.245437	0.55557	0.55557
21	21	0.257709	0.514103	0.514103
22	22	0.269981	0.471397	0.471397
23	23	0.282252	0.427555	0.427555
24	24	0.294524	0.382683	0.382683
25	25	0.306796	0.33689	0.33689
26	26	0.319068	0.290285	0.290285
27	27	0.33134	0.24298	0.24298
28	28	0.343612	0.19509	0.19509

Go to Data/Data Analysis

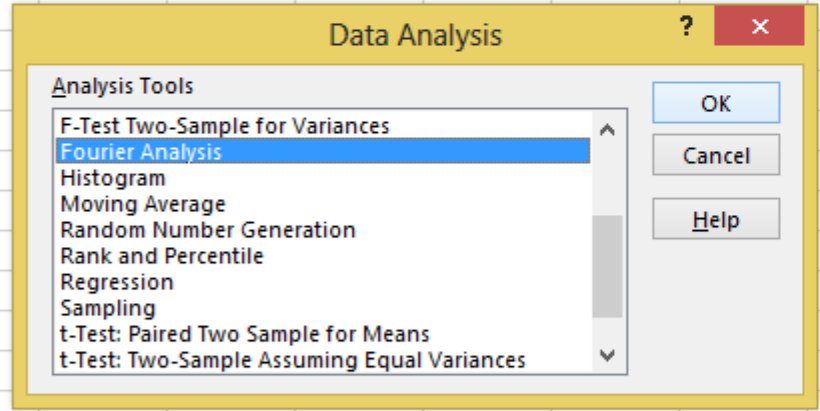


Data Analysis Tools
Tools for financial and s
analysis.
FUNCRES
Tell me more

D1 : 0.998795456205172

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	1	0.012272	0.998795	0.998795															
2	2	0.024544	0.995185	0.995185															
3	3	0.036816	0.989177	0.989177															
4	4	0.049087	0.980785	0.980785															
5	5	0.061359	0.970031	0.970031															
6	6	0.073631	0.95694	0.95694															
7	7	0.085903	0.941544	0.941544															
8	8	0.098175	0.92388	0.92388															
9	9	0.110447	0.903989	0.903989															
10	10	0.122718	0.881921	0.881921															
11	11	0.13499	0.857729	0.857729															
12	12	0.147262	0.83147	0.83147															
13	13	0.159534	0.803208	0.803208															
14	14	0.171806	0.77301	0.77301															
15	15	0.184078	0.740951	0.740951															
16	16	0.19635	0.707107	0.707107															
17	17	0.208621	0.671559	0.671559															
18	18	0.220893	0.634393	0.634393															
19	19	0.233165	0.595699	0.595699															
20	20	0.245437	0.55557	0.55557															
21	21	0.257709	0.514103	0.514103															
22	22	0.269981	0.471397	0.471397															
23	23	0.282252	0.427555	0.427555															
24	24	0.294524	0.382683	0.382683															
25	25	0.306796	0.33689	0.33689															
26	26	0.319068	0.290285	0.290285															
27	27	0.33134	0.24298	0.24298															
28	28	0.343612	0.19509	0.19509															

Select Fourier Analysis in the Data Analysis menu.



D1 : 0.998795456205172

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	1	0.012272	0.998795	0.998795															
2	2	0.024544	0.995185	0.995185															
3	3	0.036816	0.989177	0.989177															
4	4	0.049087	0.980785	0.980785															
5	5	0.061359	0.970031	0.970031															
6	6	0.073631	0.95694	0.95694															
7	7	0.085903	0.941544	0.941544															
8	8	0.098175	0.92388	0.92388															
9	9	0.110447	0.903989	0.903989															
10	10	0.122718	0.881921	0.881921															
11	11	0.13499	0.857729	0.857729															
12	12	0.147262	0.83147	0.83147															
13	13	0.159534	0.803208	0.803208															
14	14	0.171806	0.77301	0.77301															
15	15	0.184078	0.740951	0.740951															
16	16	0.19635	0.707107	0.707107															
17	17	0.208621	0.671559	0.671559															
18	18	0.220893	0.634393	0.634393															
19	19	0.233165	0.595699	0.595699															
20	20	0.245437	0.55557	0.55557															
21	21	0.257709	0.514103	0.514103															
22	22	0.269981	0.471397	0.471397															
23	23	0.282252	0.427555	0.427555															
24	24	0.294524	0.382683	0.382683															
25	25	0.306796	0.33689	0.33689															
26	26	0.319068	0.290285	0.290285															
27	27	0.33134	0.24298	0.24298															
28	28	0.343612	0.19509	0.19509															

Type in the input range, which is column D. Note that you should explicitly give the numbers and these must be a multiple of 2. I have used 512. The output range is in column F (my choice).

Fourier Analysis ? X

Input
 Input Range:

Labels in First Row

Output options
 Output Range:

New Worksheet Ply:

New Workbook

Inverse

F1 : X ✓ fx 0

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	1	0.012272	0.998795	0.998795		0													
2	2	0.024544	0.995185	0.995185		0													
3	3	0.036816	0.989177	0.989177		0													
4	4	0.049087	0.980785	0.980785		0													
5	5	0.061359	0.970031	0.970031		255.691635788524+12.5613246278187i													
6	6	0.073631	0.95694	0.95694		0													
7	7	0.085903	0.941544	0.941544		0													
8	8	0.098175	0.92388	0.92388		0													
9	9	0.110447	0.903989	0.903989		0													
10	10	0.122718	0.881921	0.881921		0													
11	11	0.13499	0.857729	0.857729		0													
12	12	0.147262	0.83147	0.83147		0													
13	13	0.159534	0.803208	0.803208		0													
14	14	0.171806	0.77301	0.77301		0													
15	15	0.184078	0.740951	0.740951		0													
16	16	0.19635	0.707107	0.707107		0													
17	17	0.208621	0.671559	0.671559		0													
18	18	0.220893	0.634393	0.634393		0													
19	19	0.233165	0.595699	0.595699		0													
20	20	0.245437	0.55557	0.55557		0													
21	21	0.257709	0.514103	0.514103		0													
22	22	0.269981	0.471397	0.471397		0													
23	23	0.282252	0.427555	0.427555		0													
24	24	0.294524	0.382683	0.382683		0													
25	25	0.306796	0.33689	0.33689		0													
26	26	0.319068	0.290285	0.290285		0													
27	27	0.33134	0.24298	0.24298		0													
28	28	0.343612	0.19509	0.19509		0													

Indeed this is the Fourier transform of a perfect cosine function. If there is no noise and only one cosine then there is only one Fourier component (one frequency).