

# Lecture 7: Fourier Transform

## Part 2: Basic DFT examples

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### Notes:

- Sample images are available in the images folder of the current directory. (You may need to add images folder into your path.)
- Related lecture: Lecture7 - Fourier Transform
- pdf versions of the .mlx files are also available for those using GNU Octave

```
% clear workspace variables and close windows
close all, clearvars, clc;
```

### DFT in 1D

```
f = [5, 7, 1, 4] % input series
```

```
f = 1x4
     5     7     1     4
```

```
sum(f)
```

```
ans = 17
```

```
F = fft(f) % Fourier series
```

```
F = 1x4 complex
    17.0000 + 0.0000i    4.0000 - 3.0000i   -5.0000 + 0.0000i    4.0000 + 3.0000i
```

```
abs(F) % magnitude of the Fourier transform
```

```
ans = 1x4
     17     5     5     5
```

```
invF = ifft(F) % Inverse Fourier Transform
```

```
invF = 1x4
     5     7     1     4
```

### DFT in 2D

```
I = [10 70; 200 150] % input series
```

```
I = 2x2
```

```
10    70
200   150
```

```
sum(I(:))
```

```
ans = 430
```

```
IF = fft2(I) % Fourier series
```

```
IF = 2×2
    430    -10
   -270   -110
```

```
abs(IF) % magnitude of the Fourier transform
```

```
ans = 2×2
    430     10
    270    110
```

```
invF = ifft2(IF) % Inverse Fourier Transform
```

```
invF = 2×2
    10     70
   200    150
```