סעיף א

We will mark the Fourier transform of as

From the properties of convolution, we get that

So, our process will be like so-

1. Calculate
2. Calculate
3. Using the inverse Fourier transform, calculate

Step 1

We’ll define the box function .

So

is even, meaning . So, we know that

From the duality property of Fourier transformations, we know that

Combining (1) and (2), we get that .

Step 2

We know that the Fourier transformation of a convolution is the product of the Fourier transformations.

So,

Step 3

Since we know that , by applying , we get that .

And so, we got that

So .

סעיף ג

Need to prove-

From the definition of impulse, we get that

We also know that

And from the duality property we get that

Meaning that .

From the definition of Fourier transformations, we know that

And so,

Substituting this result back, we get that

As required.