Task 13-01

- The file **samples_square.csv** contains the captured waveform data of a signal having amplitude = 1 over the interval and zero everywhere else
- Run Cell 7 in **fourier_discrete.ipynb** and then append a new Cell 8 that answers these questions in your own words:
    1. Why does the power spectrum of the sampled waveform have so many frequencies?
    2. Why does the magnitude of the DC component ?
    3. Why are there no sine components in its DFT?
- Upload your solution to the BNL QIS101 SharePoint site

Task 13-02

In the file **uncertainty_principle.ipynb** append a new Cell 2 that answers these questions in your own words:

1. Why do the Fourier Transform frequencies **spread out** as we more tightly confine where the particle is *likely* to be found?
2. At the **end** of the animation, when the Power Spectrum shows only **one** frequency, why does the probability of finding the particle at any point spread out *infinitely*?
3. Do you believe a particle with 100% exactly known momentum could potentially exist *anywhere* in the universe – why or why not?

- Upload your solution to the BNL QIS101 SharePoint site

Task 13-03

- The data file **unknown_wave.csv** contains samples of a waveform generated by this formula:

- Create a Jupyter Lab notebook called **unknown_wave.ipynb** that identifies the and constants used to generate the sampled data
- Upload your solution to the BNL QIS101 SharePoint site