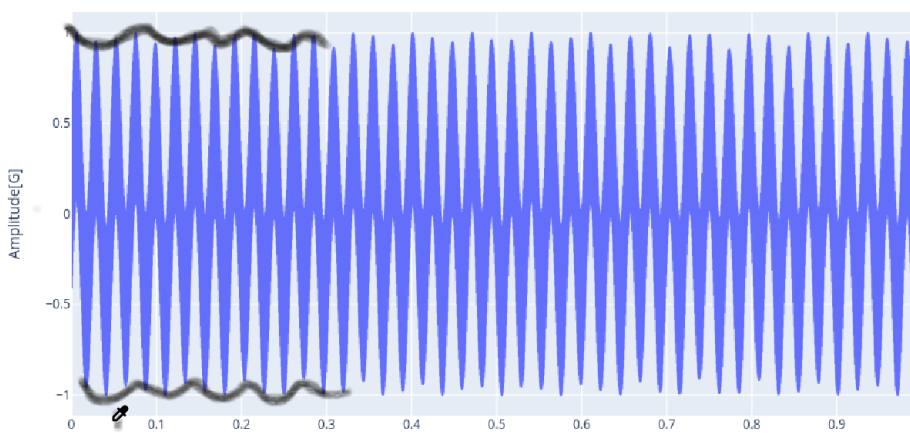Q1:
The first graph (time domain) shows the progression of the signal over time.
It allows you to see the shape of the signal changing over time.

- The second graph is a frequency domain graph showing us different energies in the signal depending on their frequency.

We can see a first low frequency of 20-40hz and a high frequency of 4KHZ.

By counting how many times the signal amplitude changes per second in the first graph, we can see it matches the low-frequency peak in the second graph.

The high frequency moves so fast that the lines blur together. We have to zoom in to see the different cycles clearly to identify the frequency.

Q2:

To check whether it is the same signal source, we need to compare them mathematically:

A . Frequency test:
On the time domian graph: I counted 4 cycles every 0.1 seconds, which equals 40 cycles per second (40 Hz).
On the frequency graph: We see a peak at about 40Hz.

Conclusion: Since the rate in the first graph matches exactly the value in the second graph, this is a clear sign that it is the same data.

B. Amplitude test:
 Check the power for both graphs
On the time domain graph: the signal reaches a peak of 1.0.
On the frequency graph: the central peak (at 4000Hz) also reaches a value of 1.0.
This reinforces the fact that we are seeing the same signal.

C. Clean data:
The time graph looks clean and steady, with no random noise or unexpected jumps.
In the frequency graph there are 2 frequencies without any harmonics, meaning there are 2 frequencies.
This means that it is probably the same signal.

Q3:

- The first graph shows all the vibrations mixed together. The second graph breaks down the signal and clearly shows that there are two separate sources: slow vibration (40Hz) and fast vibration (4000Hz).

- Diagnosing the noise source: Since each part of the machine vibrates at a different frequency, the second graph allows me to pinpoint the specific component that is causing the problem, which is not possible with the time graph. (Since each part of the machine vibrates at a different rate - i can identify which component is vibrating)

In summary: the time graph shows what the vibration looks like, while the frequency graph shows the different parts of the vibration and where they come from.