Using the FFT Function on the Tektronix Scope

The Fast Fourier Transform (FFT) allows us to see the various signals in our waveform. If I have a square wave, for instance, we know that it is comprised of a sum of sine waves:

$$v(t) = V_{DC} + V_1 \sin(\omega t) + V_3 \sin(3\omega t) + V_5 \sin(5\omega t) + \cdots$$

If we look at the FFT of this waveform, we will see "spectral lines" at the following frequencies: DC, $\omega, 3\omega, 5\omega$, etc. You'll learn more about this in Signals and Systems.

We can measure the FFT using the oscilloscope. Let's assume you're looking at a signal on Channel 1 (yellow):

- Make sure the oscilloscope is DC-coupled, and make sure that 1x or 10x are set appropriately
- Adjust the time base of the oscilloscope so that many periods of the waveform (more than 10) are visible on the screen. This may make the waveform look like a big yellow smear.
- Press the Math button on the scope to enter Math mode. Use the following settings:
    - Source: Channel 1
    - Operation: FFT
    - Window: Hanning
- You will see a red signal which is the FFT of the waveform. To make measurements, use the cursors. Under the Curson menu, make sure to set the following:
    - Source: Math
- Using the cursors, you can change the type between "Frequency" and "Magnitude." Note the following:
    - Magnitude is measured along the y-axis
    - Frequency is measured along the x-axis