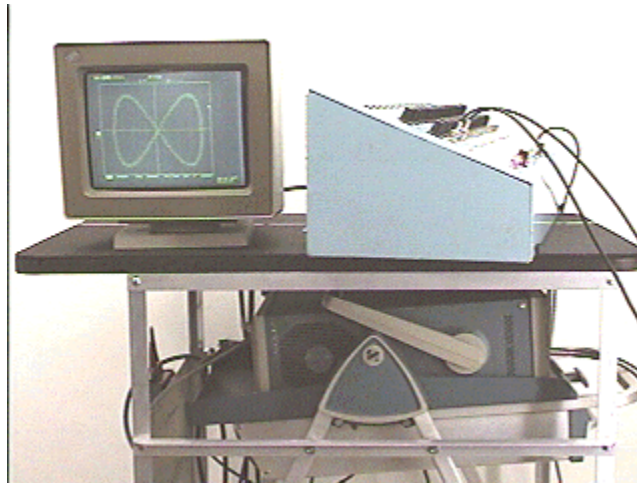
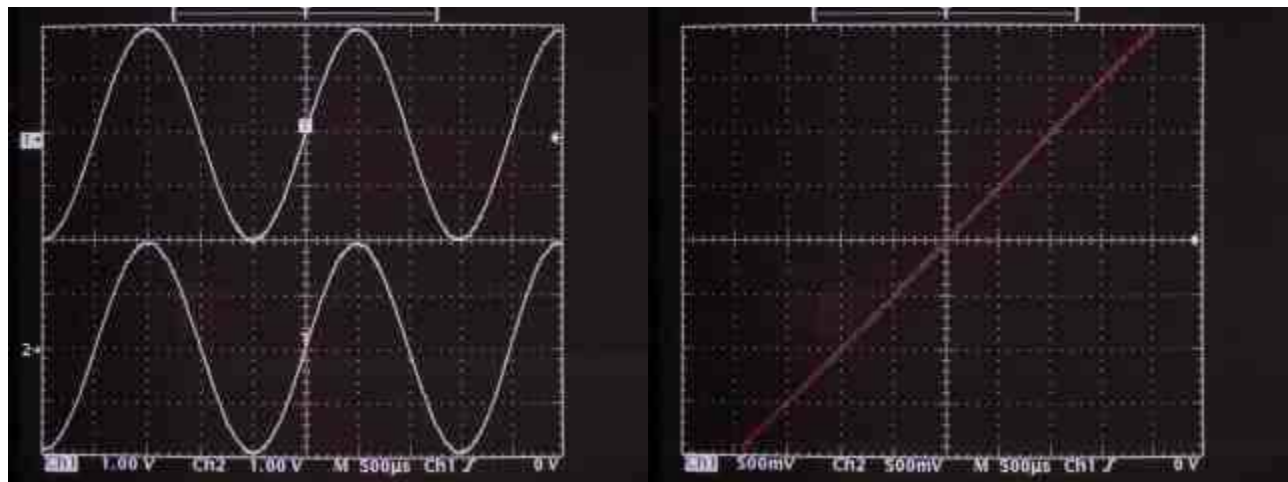


Question #221

This question deals with Lissajous figures, the neat two-dimensional art-like figures like the one seen in the photograph below, that are produced when an object (such as the electron beam of the oscilloscope) moves simultaneously in horizontal and vertical oscillations. The figures for this question are created using the University of Maryland Physics Lecture-Demonstration Facility Fourier Synthesizer, seen in the photograph below.

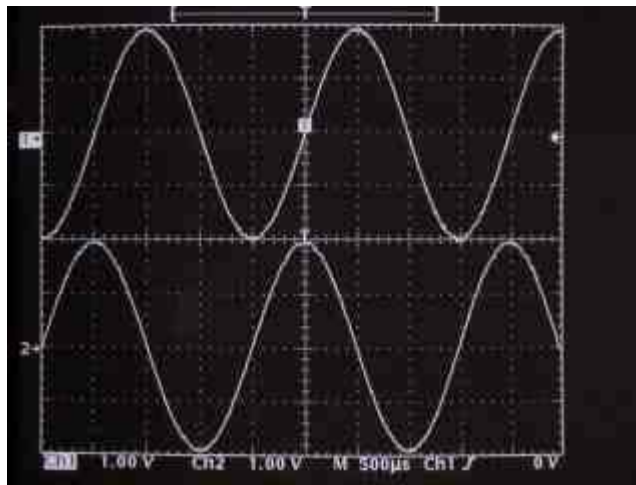


For example, if the x and y vs. time motion of the electron beam are as seen in the oscilloscope figure at the left below, then they will produce the Lissajous figure at the right below. In this case, $x = y$ at all times, so the "figure" is a diagonal line at 45° with respect to the x and y axes. The graphs of x and y vs. time are known as reference graphs.

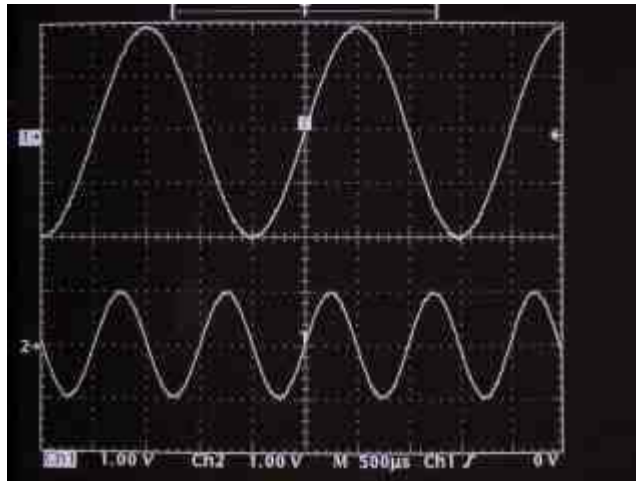


Below are several sets of reference graphs for Lissajous figures. You are to determine what the corresponding Lissajous figures will look like.

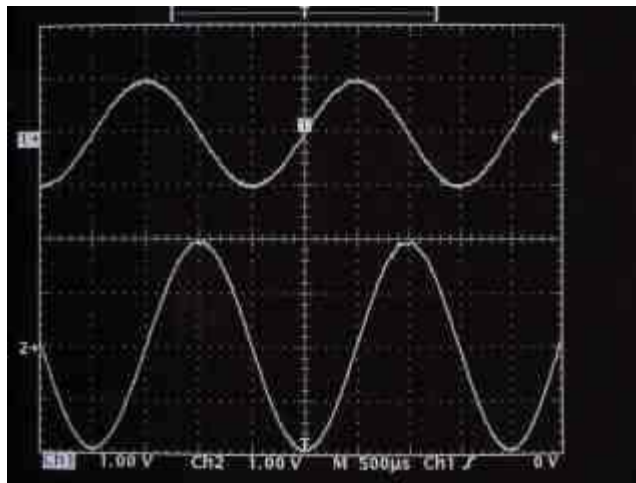
(2)



(3)

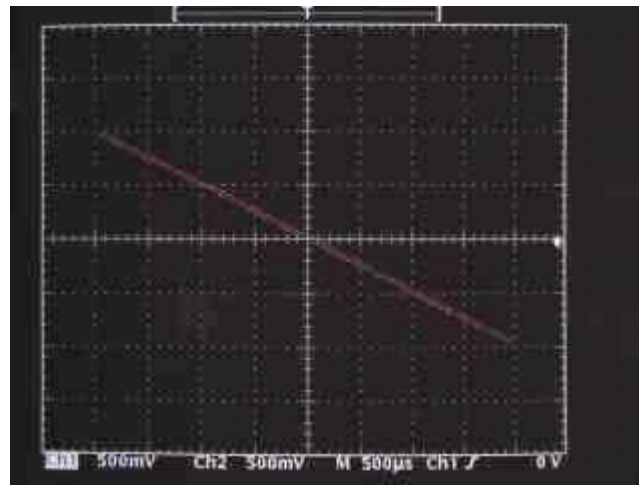


(4)

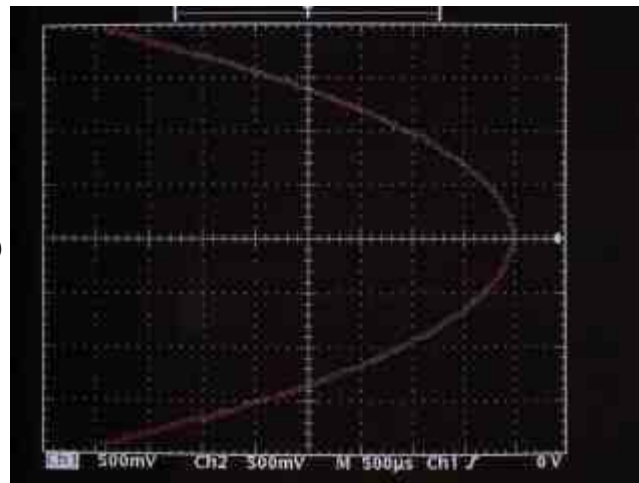


Below are several Lissajous figures. You are to determine what the corresponding reference graphs will look like.

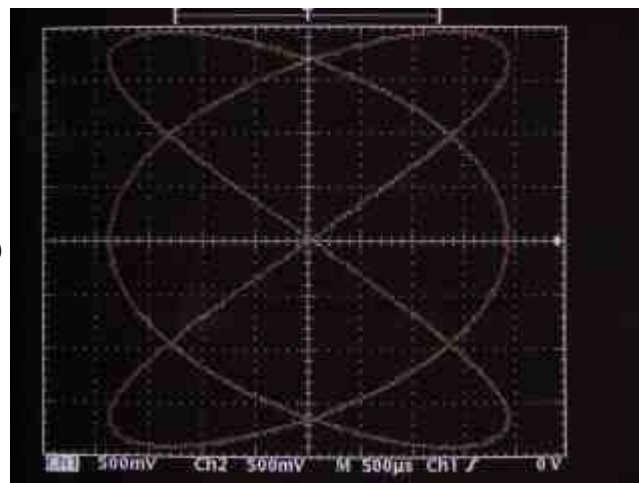
(5)



(6)



(7)



Click here for [Answer #221](#) after May 16, 2005.

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For questions and comments regarding the *Question of the Week* contact [Dr. Richard E. Berg](#) by e-mail or using phone number or regular mail address given on the [Lecture-Demonstration Home Page](#).