CURVES, FUNCTIONS, EQUATIONS AND DESMOS

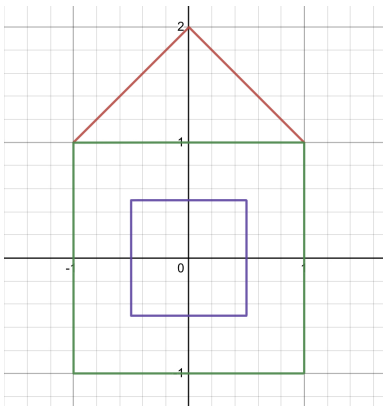
1. Sketch each of these curves:
   (1) $y = x^2$
   (2) $x = y^2$
   (3) $y = sin(x)$
   (4) $y = cos(x)$
   (5) $y = sin(x) + cos(x)$
   (6) $y = sin(x) \times cos(x)$
   (7) $y = sin(x^2) + cos(x^2)$
   (8) $y = sin(x)^2 + cos(x)^2$
   (9) $sin(x) + cos(y) = 10$
   (10) $sin(x) + cos(y) = 2$
   (11) $sin(x) + cos(y) = 0$
   (12) $sin(x) + cos(y) = 1$
2. Sketch

$$\begin{cases} \text{Line 1:} & x^2 + y^2 = 9 \\ \text{Line 2:} & ((x-1)^2 + (y-1)^2 - 0.4) \times ((x+1)^2 + (y-1)^2 - 0.4) = 0 \\ \text{Line 3:} & y = -(1-x^2)^{1/2} \end{cases}$$

3. Sketch

$$\begin{cases} \text{Line 1:} & y = (x^2)^{1/2} + (9-x^2)^{1/2} \\ \text{Line 2:} & y = (x^2)^{1/2} - (9-x^2)^{1/2} \end{cases}$$

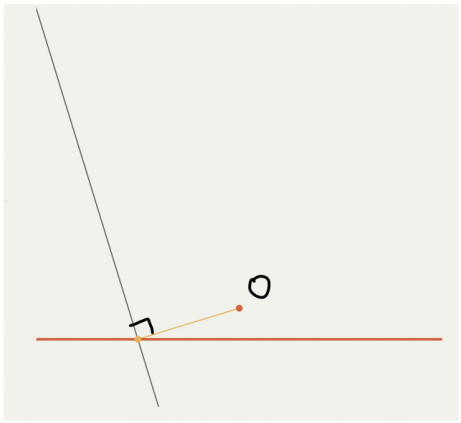
4. Write down equations on the coordinates (x, y) of the sets those union would be represented by this picture of a house.

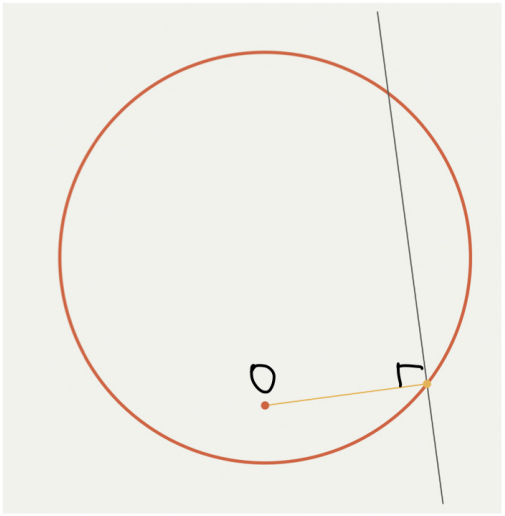


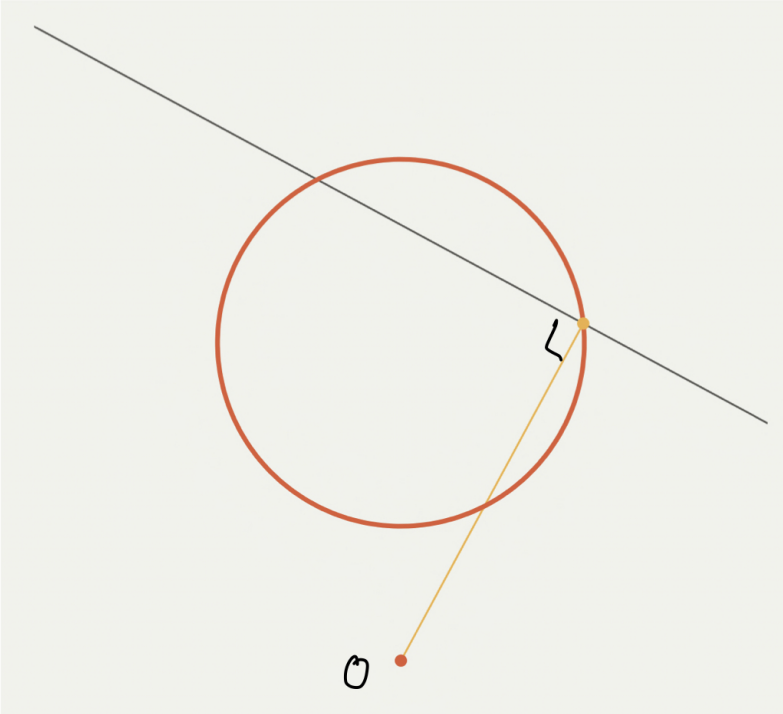
5. Create your own fun picture from equations. Show in graphing calculator equations and the resulting picture.

6. Enveloping curves and trajectories

Draw perpendicular lines to the segments that connect point O with points on the line (circle). What will be the "envelope" of this family of lines?






1
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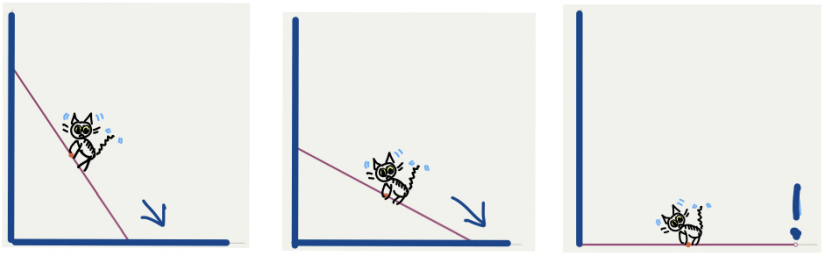
A cat is sitting in the middle of a ladder leaning against the wall. What is the trajectory of the cat if the ladder starts to slide down?



The November 2012 issue of *Handyman* (a journal specializing on home improvement topics) published the following tip: "**Make a circle with a square.** Here's a tip for laying out small circles or parts of circles.

Tack two nails to set the diameter you want, then rotate a framing square against the nails while you hold a pencil in the corner of the square. You might need to rub a little wax or some other lubricant on the bottom of the square so it slides easily. Don't ask us why this process works; all we know is that it does."