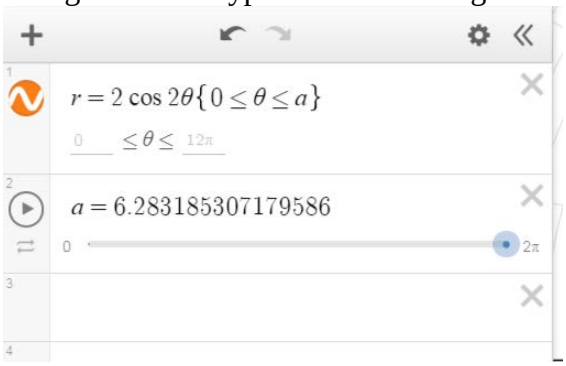
MATH 22: Calculus II - Worksheet 9, §10.3-10.4,

1. Plot the following points in polar coordinates.
   $(1, 2\pi/3), (2,-\pi/6), (-1,\pi/4), (2,-3\pi/2)$,
2. Convert polar points in exercise 1 to Cartesian coordinates
3. Convert Cartesian points: $(-1/2, -\sqrt{3}/2), (-3,\sqrt{3}), (\sqrt{6}/2,\sqrt{6}/2), (\sqrt{3},-1)$ into polar coordinates.
4. Sketch the following curves
   a. $r = \sin(3\theta)$
   b. $r^2 = 9\sin(2\theta)$
   c. $r = 1 - a\sin(\theta)$ where a = 0, 1, 2
   d. $r = 2 + \sin(3\theta)$
   e. Find intersection points between $r = 2\sin(3\theta)$ and $r = 1$
5. Using Desmos: Type in the following commands into Desmos command box.



To enter greek, Θ type in *theta*, to get π type *pi*. The slide for *a* will appear immediately after you type in the inequality.

- Click on the slide bar to enter 0 and 2π.
- Click on the wrench and select polar plot.

By controlling the slide and changing the polar equation on the first line, trace all the curves in Exercise 4. You can display multiple polar cuves by adding additional entries under the first one. Complete the rest of exercises with the help of Desmos.

6. Identify the curve $r = \tan\theta\sec\theta$ by finding a Cartesian equation for the curve.
7. Find a polar equation for the curve represented by $4y^2 = x$
8. For the cartdioid $r = 1 + \cos\theta$

a. Find the slope of the tangent line when $\theta = \frac{\pi}{3}$

b. Find the points on the cardioid where the tangent line is vertical or horizontal.

9. Calculate the slope of the curve $r = \sin(3\theta)$ at $\theta = \frac{\pi}{6}$. Find the area of one petal