

$$r = 5 \sin(4\theta) \quad \text{even} / 2(4)$$

$$r = 6 \sin(3\theta) \quad \text{odd} = 8 \text{ petals}$$

length of petal / radius

$$x = 4 \cos \theta$$

$$y = 2 \sin \theta$$

θ	x	y
0	4	0
$\frac{\pi}{2}$	0	2
π	-4	0
$\frac{3\pi}{2}$	0	-2
2π	4	0

$$x = 4 \cos 0$$

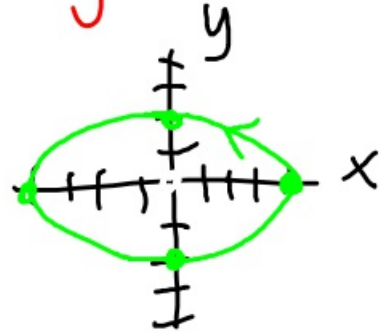
$$x = 4(1)$$

$$x = 4$$

$$y = 2 \sin 0$$

$$y = 2(0)$$

$$y = 0$$



eliminate parameter

$$x = 4 \cos \theta$$

$$y = 2 \sin \theta$$

$$\cos \theta = \frac{x}{4}$$

$$\sin \theta = \frac{y}{2}$$

$$\cos^2 \theta + \sin^2 \theta = 1$$

$$\left(\frac{x}{4}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$$

$$\frac{x^2}{16} + \frac{y^2}{4} = 1$$

$$(3, 25^\circ)$$

polar \rightarrow rectangular

$$x = r \cos \theta \quad y = r \sin \theta$$

$$x = 3 \cos 25^\circ \quad y = 3 \sin 25^\circ$$

$$(3, \frac{\pi}{4}) \quad x = 3 \cos \frac{\pi}{4} \quad y = 3 \sin \frac{\pi}{4}$$
$$x = 3 \left(\frac{\sqrt{2}}{2} \right) \quad y = 3 \frac{\sqrt{2}}{2}$$
$$\left(\frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2} \right)$$

$$(-3, 3) \rightarrow (r, \theta)$$

$\begin{matrix} x & y \\ \text{rect} & \rightarrow & \text{polar} \end{matrix}$

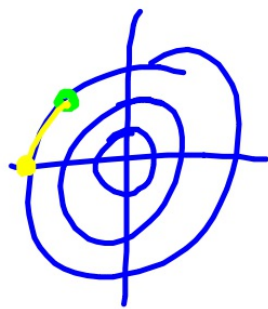
$$x^2 + y^2 = r^2$$

$$(-3)^2 + (3)^2 = r^2$$

$$18 = r^2$$

$$(-3\sqrt{2}, -45^\circ) \quad r = \pm 3\sqrt{2}$$

$$(-3\sqrt{2}, 315^\circ)$$



$$(3\sqrt{2},)$$

$$\tan \theta = \frac{y}{x}$$

$$\tan \theta = \frac{3}{-3}$$

$$\tan \theta = -1$$

$$\theta = 135^\circ$$

$$(3\sqrt{2}, 135^\circ)$$

$$r = 5 \csc \theta$$

$$r \sin \theta$$

$$\sin \theta r = 5 \cdot \frac{1}{\sin \theta} \sin \theta$$

$$r \sin \theta = 5$$

$$y = 5$$

$$r \cdot r = 5 \cos \theta \cdot r$$

$$r^2 = 5r \cos \theta$$

$$x^2 + y^2 = 5x$$

$$x^2 - 5x + \frac{25}{4} + y^2 = 0 + \frac{25}{4}$$

$$\frac{1}{2}(-5)$$
$$\left(-\frac{5}{2}\right)^2$$
$$F(2.5, 0)$$

$$\left(x - \frac{5}{2}\right)^2 + y^2 = \frac{25}{4}$$

$$\frac{x^2}{9} + \frac{y^2}{16} = 1$$

$$\frac{x^2}{3^2} + \frac{y^2}{4^2} = 1$$

$$\frac{(x-1)^2}{3^2} + \frac{(y+4)^2}{4^2} = 1$$

$$\begin{aligned}x &= 3\cos\theta + 0 \\y &= 4\sin\theta + 0\end{aligned}$$

$$\begin{aligned}x &= 3\cos\theta + 1 \\y &= 4\sin\theta - 4\end{aligned}$$

P739

39.

7, 9, 11, ...

$$S_{25} = \frac{n}{2}(a_1 + a_n)$$

$$S_{25} = \frac{25}{2}(7 + 55)$$

$$a_n = a_1 + (n-1)d$$

$$a_n = 7 + (n-1)2$$

$$a_n = 2n + 5$$

$$a_{25} = 2(25) + 5$$

55

para \rightarrow rect.

$$\begin{cases} x = t + 4 \\ y = 3 - 2t \end{cases}$$

$$x = t + 4$$

$$t = x - 4$$

$$y = 3 - 2(x - 4)$$

$$y = 3 - 2x + 8$$

$$y = -2x + 11$$

Eliminate the parameter

$$\begin{aligned}x &= 7 \sin \theta \\ y &= 3 \cos \theta\end{aligned}$$

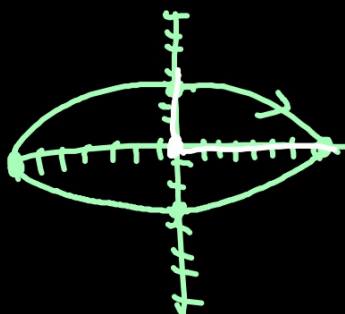
$$\sin \theta = \frac{x}{7} \quad \cos \theta = \frac{y}{3}$$

$$\cos^2 \theta + \sin^2 \theta = 1$$

$$\left(\frac{y}{3}\right)^2 + \left(\frac{x}{7}\right)^2 = 1$$

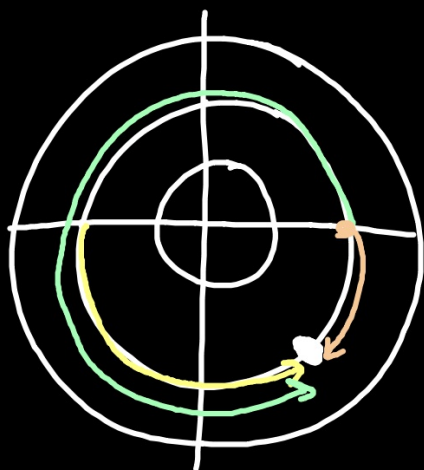
$$\frac{y^2}{9} + \frac{x^2}{49} = 1$$

θ	x	y
0	0	3
$\frac{\pi}{2}$	7	0
π	0	-3
$\frac{3\pi}{2}$	-7	0
2π	0	3



$$\frac{x^2}{7^2} + \frac{y^2}{3^2} = 1$$

Plot point $(-2, -\frac{5\pi}{4})$



$$(-2, \frac{3\pi}{4})$$

$$(2, \frac{7\pi}{4})$$

$$(2, -\frac{\pi}{4})$$

$$y=5 \quad \text{rect} \rightarrow \text{polar}$$

$$r \sin \theta = 5 \quad y = r \sin \theta$$

$$r = \frac{5}{\sin \theta}$$

$$r = 5 \csc \theta$$

$$5x^2 - 4x + 5y^2 = 0$$

$$5x^2 + 5y^2 - 4x = 0$$

$$5(x^2 + y^2) - 4x = 0$$

$$5r^2 - 4r\cos\theta = 0$$

$$r(5r - 4\cos\theta) = 0$$

$$\cancel{r=0}$$

$$5r - 4\cos\theta = 0$$

$$5r = 4\cos\theta$$

$$r = \frac{4}{5}\cos\theta$$

$$x^2 + y^2 = r^2$$

$$x = r\cos\theta$$

$$r = 110049625 \sin(401\theta)$$

radius/length petal: 110049625

how many petals: odd # \rightarrow exact
even # \rightarrow double
value

parameterize the equation

$$\frac{(x+3)^2}{49 \cdot 7^2} + \frac{(y-5)^2}{64 \cdot 8^2} = 1$$

$C(-3, 5)$

$$x = 7 \cos \theta - 3$$

$$y = 8 \sin \theta + 5$$

Ex $a_{10} = 5$ L_1 - term #
 $a_{13} = 14$ L_2 - term
 L_1 L_2

explicit/ a_n : STAT/CALC/4/VARS/YVARS/E/E

$$a_n = 3n - 25$$

to find a particular term:

$a_{99} = 272$ 2nd/window/
start: 99
3rd/graph

OR $Y_1(99)$

homescreen

VARS/YVARS/E/E

$Y_1(\#)$

Find 12th partial sum

$$S_{12} = -66$$

2nd/STAT/MATH/5

2nd/STAT/OPS/5

SUM(seq(Y_1 , X, start, end))