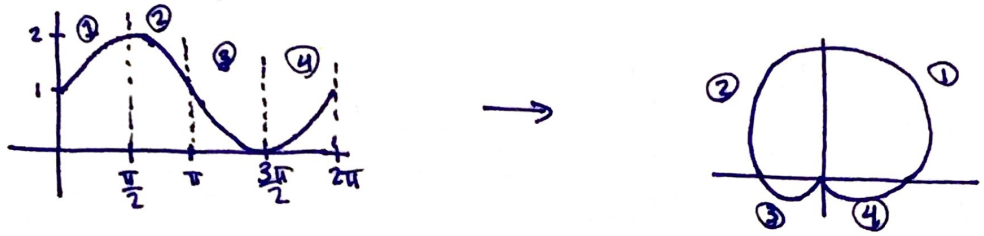
Graphing

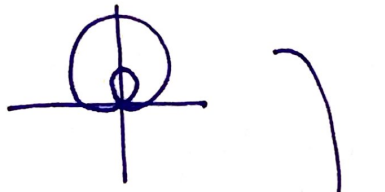
Ex 1 $r = 1 + \sin\theta$

First we graph as if $r = y$, $\theta = x$

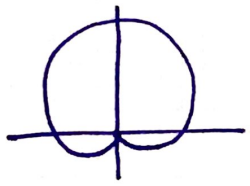


In general, if $r = a \pm b\sin\theta$ where $a, b > 0$

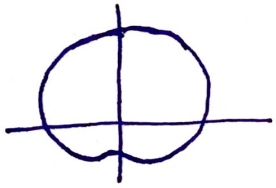
if $\frac{a}{b} < 1$,



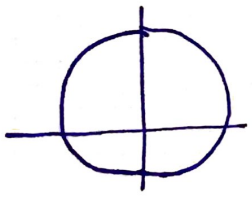
$\frac{a}{b} = 1$



$1 < \frac{a}{b} < 2$



$\frac{a}{b} \geq 2$



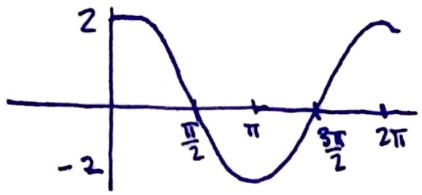
$r = a + b\sin\theta$

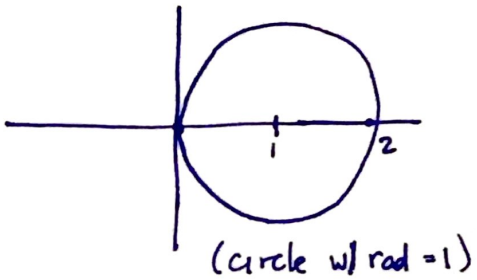
For $a - b\sin\theta$, reflect over ~~polar~~ horizontal axis

For $r = a \pm b\cos\theta$, we get similar shapes going along the horizontal axis

Ex 2

$r = 2\cos\theta$





(circle w/ rad = 1)

Another way: $r = 2\cos\theta$

$\cos\theta = \frac{x}{r} \Rightarrow r = 2\frac{x}{r} \Rightarrow r^2 = 2x$

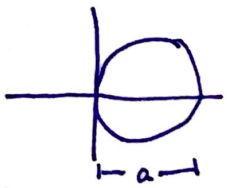
Now $r^2 = 2x = x^2 + y^2$.

Completing the square, $x^2 - 2x + 1 + y^2 = 1$

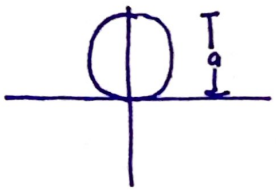
$(x-1)^2 + y^2 = 1$

In general, $a > 0$

$r = a\cos\theta$



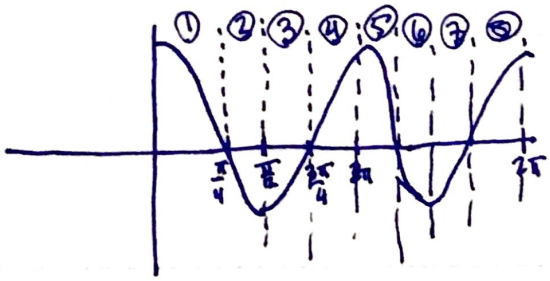
$r = a\sin\theta$

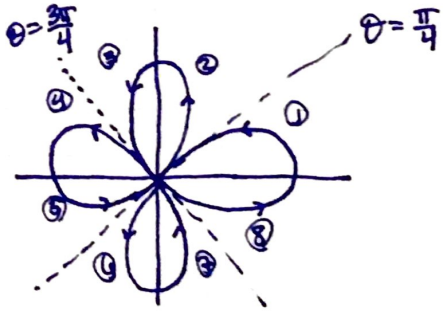


Rose curves

$r = a\sin(n\theta)$ or $r = a\cos(n\theta)$ $a \neq 0$, n an integer > 1.

Ex 3/ $r = \cos 2\theta$





Remark If n is even, the rose will have $2n$ petals
If n is odd, the rose will have n petals.

Take advantage of symmetry

a) Replace θ with $-\theta$. If we get the same result, the curve is symmetric about the polar axis.

b) Replace r with $-r$ and θ with $\theta + \pi$. If we get the same result, the curve is symmetric about the pole.

c) Replace θ with $\pi - \theta$. If we get the same result, the curve is symmetric about $\theta = \pi/2$.