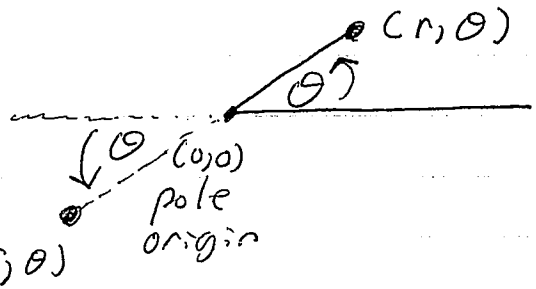
Polar Coordinates



$(r, \theta + \pi)$

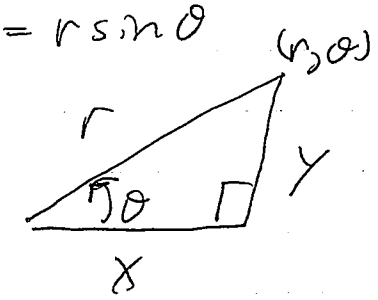
relationship between Cartesian and Polar

$x = r\cos\theta$

$y = r\sin\theta$

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

$\tan\theta = y/x$



Examples

1) $r = C$ where C is a constant, is a circle radius $|C|$.

2) $\theta = C$ A line through the pole (origin) with a slope of $\tan(c)$.

3) $r = \theta$ a spiral

4) $r = 2\sin\theta$ $\quad x = r\cos\theta = 2\sin\theta\cos\theta \quad y = r\sin\theta = 2\sin^2\theta$

or $r = 2\sin\theta$

$y = r\sin\theta$

$2y = r\,2\sin\theta = r(r) = r^2 = x^2 + y^2$

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

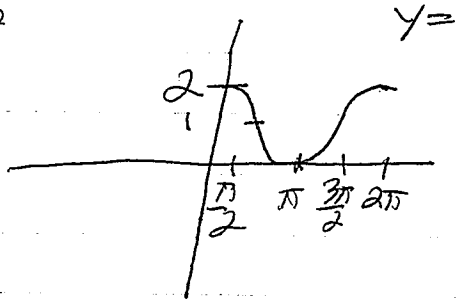
$y^2 - 2y + 1 + x^2 = 1$

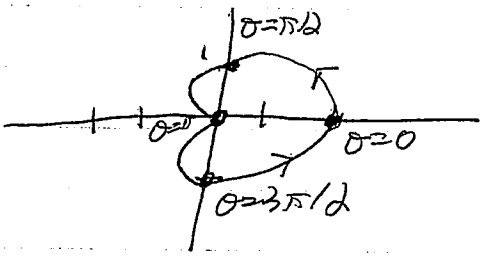
$(y-1)^2 + x^2 = 1$

circle radius 1 centered at $(0, 1)$

5) The Cardioid

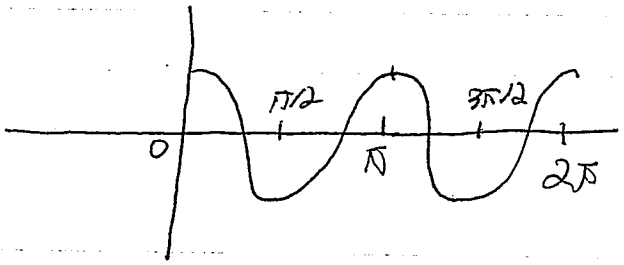
$r = 1 + \cos\theta$

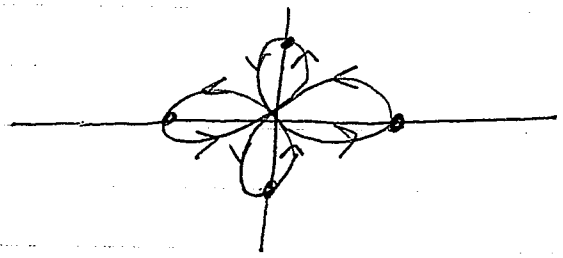




6) leaf rose

$r = \cos(2\theta)$





$r = \cos(n\theta)$

If n is even, $2n$ leaf rose

If n is odd, n leaf rose