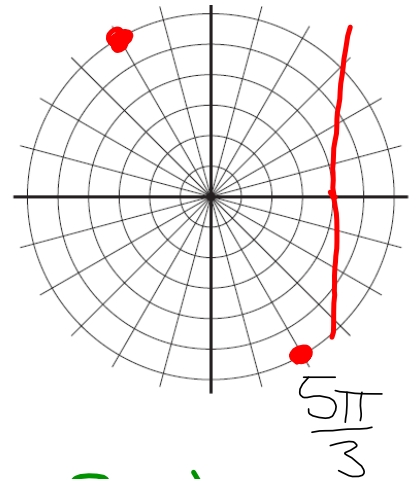


Warm up

1. Convert to rectangular form and sketch.

a. $r = -6 \sin \theta$

b. $r = 5$ $x^2 + y^2 = 25$
 $r^2 = 25$



2. Name three equivalent points for $(-6, -\frac{\pi}{3})$

$(6, \frac{2\pi}{3})$ $(-6, \frac{5\pi}{3})$ $(6, \frac{8\pi}{3})$

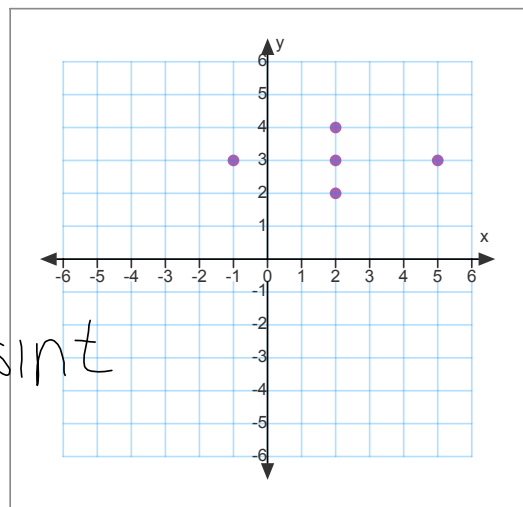
3. Find the rectangular equation by eliminating the parameter. State the domain and range and sketch the graph.

$x = 2 - 3 \cos t$ $y = 3 - \sin t$

D: $(-\infty, \infty)$

$\frac{x-2}{-3} = \cos t$ $\frac{y-3}{-1} = \sin t$

$\frac{(x-2)^2}{9} + \frac{(y-3)^2}{1} = 1$



Homework Questions

$$r = 4 \sec \theta$$

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

$$r \cos \theta = 4$$

$$x = 4$$

Generalizations So Far!

1. $r = a$ circle with center $(0, 0)$ and radius = a

2. $\theta = \text{rad}$ line through θ

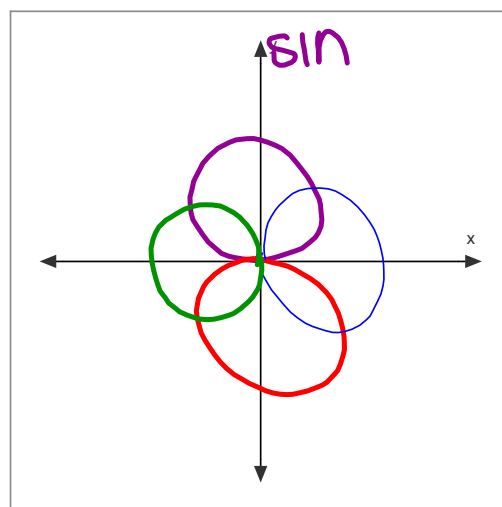
3. $r = 2a \sin \theta$

4. $r = -2a \sin \theta$

5. $r = 2a \cos \theta$

6. $r = -2a \cos \theta$

circle with radius of 'a'



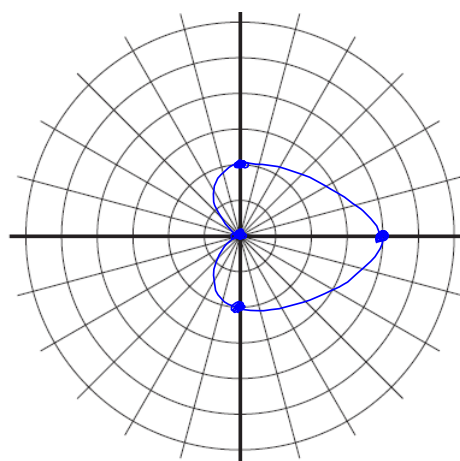
General Form of Polar Equations

$$r = a \pm b \cos \theta \qquad r = a \pm b \sin \theta$$

1. Cardioid $a = b$

$$r = 1 - \sin \theta$$

θ	r
$-\pi/2$	2
$-\pi/3$	1.87
$-\pi/6$	1.5
0	1
$\pi/4$.29
$\pi/2$	0



$$r = a \pm b \cos \theta$$

$$r = a \pm b \sin \theta$$

symmetry with trig axis

→ tip $|a| + |b|$ in direction of coefficient and trig function

sides $|a|$

$$r = 2 + 2 \cos \theta$$

2. Limacon with inner loop (loopy limacon) $a < b$

$$r = a \pm b \cos \theta$$

$$r = a \pm b \sin \theta$$

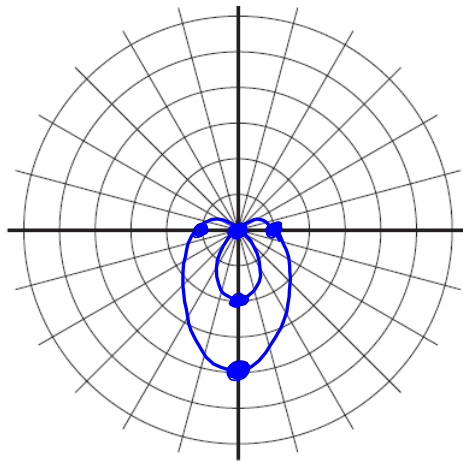
symmetry with trig axis

tip $|a| + |b|$ in direction of coefficient and trig function

sides $|a|$

loop $|b| - |a|$ towards the tip and through the pole

$$r = 1 - 3\sin\theta$$



3. Dimpled Limacon $a > b$

$$r = a \pm b \cos \theta$$

$$r = a \pm b \sin \theta$$

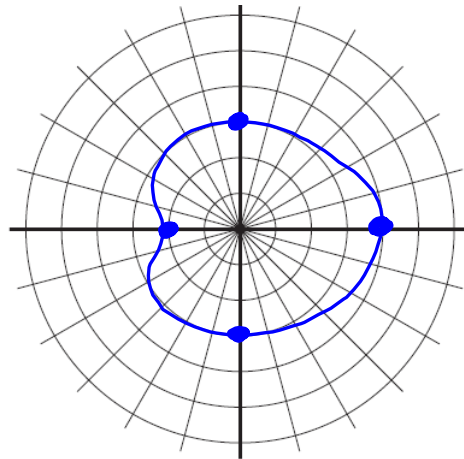
symmetry with trig axis

tip $|a| + |b|$ in direction of coefficient and trig function

sides $|a|$

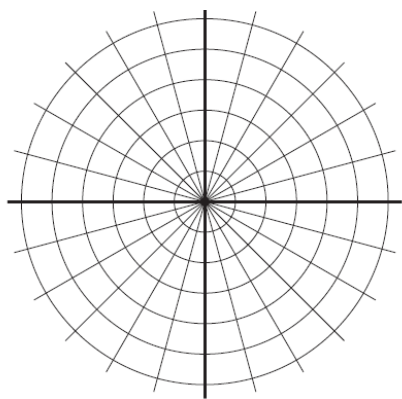
dimple $|a| - |b|$ away from the tip

$$r = 3 + \cos \theta$$



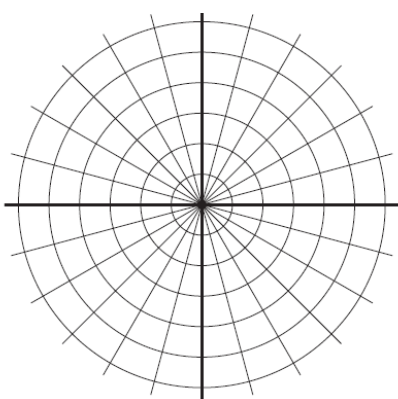
You try!!

$$r = 2 + 4\sin\theta$$



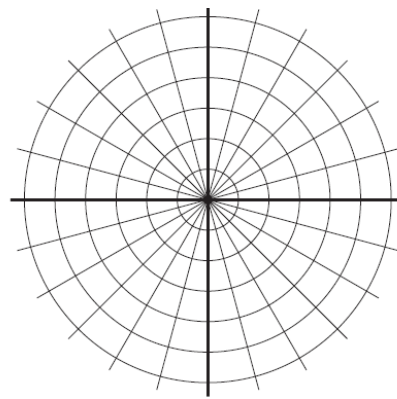
loop

$$r = 3 - 3\cos\theta$$



cardioid

$$r = 3 + \cos\theta$$



dimple

q

Homework

p720 #2-6 even, 7,8, 27-32

WB p 138 part 2 #1-12