

Math 141/142 Section B
 Summer 2007 Quiz 7

Name: "Answer Key"

1. Graph the polar equation $r = 1 + 2 \sin \theta$ and name the graph.

Replace θ by $-\theta$: $r = 1 + 2 \sin(-\theta)$
 $r = 1 - 2 \sin \theta$

No symmetry wrt x-axis.

Replace θ by $\pi - \theta$: $r = 1 + 2 \sin(\pi - \theta)$
 $r = 1 + 2 \sin \theta$ ✓

Symmetric wrt y-axis.

Replace r by $-r$: $-r = 1 + 2 \sin \theta$
 $r = -1 - 2 \sin \theta$

No symmetry wrt origin.

So we consider $[-\frac{\pi}{2}, \frac{\pi}{2}]$.

θ	$r = 1 + 2 \sin \theta$
$-\pi/2$	$1 + 2 \cdot (-1) = -1$
$-\pi/3$	$1 + 2 \cdot (-\frac{\sqrt{3}}{2}) \approx -0.73$
$-\pi/4$	$1 + 2 \cdot (-\frac{\sqrt{2}}{2}) \approx -0.41$
$-\pi/6$	$1 + 2 \cdot (-1/2) = 0$
$-\pi/12$	0.48
0	1
$\pi/12$	1.52
$\pi/6$	$1 + 2 \cdot 1/2 = 2$
$\pi/4$	$1 + 2 \cdot \frac{\sqrt{2}}{2} \approx 2.41$
$\pi/3$	$1 + 2 \cdot \frac{\sqrt{3}}{2} \approx 2.73$
$\pi/2$	$1 + 2 \cdot 1 = 3$

"limacon with an inner loop"

