POLAR CURVES
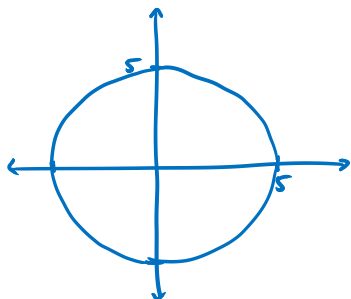
OBJECTIVES: 1) Graph polar equations.
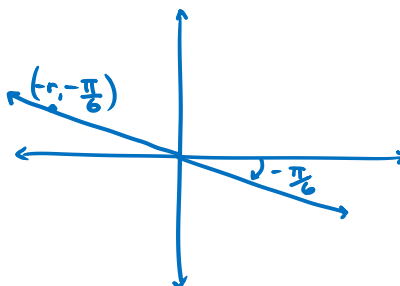
GRAPHING TECHNIQUES

1) Graph the following:

a) $r = 5$

b) $\theta = -\dfrac{\pi}{6}$
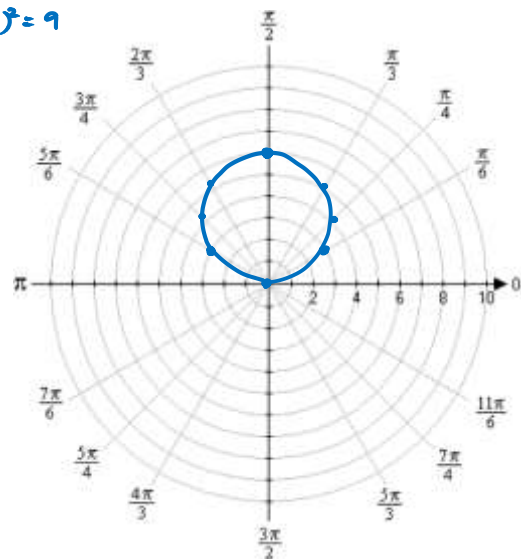

$(-r, -\tfrac{\pi}{6})$

$\theta = -\tfrac{\pi}{6}$

$r^2 = 6r\sin\theta \qquad r^2 = 6y \qquad x^2 + y^2 = 6y \implies x^2 + y^2 - 6y = 0$

2) Graph $r = 6\sin\theta$ using a table of values $(0 \le \theta \le 2\pi)$. $x^2 + (y-3)^2 = 9$

θ	0	$\dfrac{\pi}{6}$	$\dfrac{\pi}{4}$	$\dfrac{\pi}{3}$	$\dfrac{\pi}{2}$	$\dfrac{2\pi}{3}$	$\dfrac{3\pi}{4}$	$\dfrac{5\pi}{6}$	π
r	0	3	$3\sqrt{2}$	$3\sqrt{3}$	6	$3\sqrt{3}$	$3\sqrt{2}$	3	0

$\approx 4.2 \quad \approx 5.2$

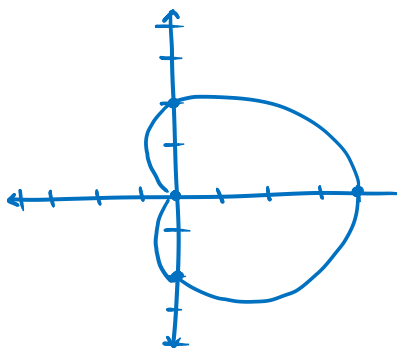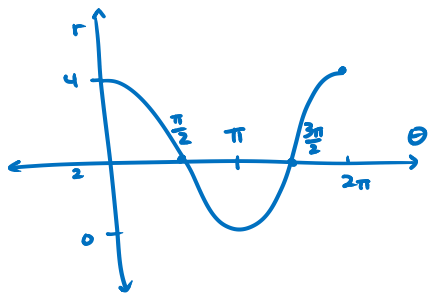| θ	$\dfrac{7\pi}{6}$	$\dfrac{5\pi}{4}$	$\dfrac{4\pi}{3}$	$\dfrac{3\pi}{2}$	$\dfrac{5\pi}{3}$	$\dfrac{7\pi}{4}$	$\dfrac{11\pi}{6}$	2π
r	-3	$-3\sqrt{2}$	$-3\sqrt{3}$	-6	$-3\sqrt{3}$	$-3\sqrt{2}$	-3	0

Circle: center @ $(0,3)$ radius 3

3) Graph $r = 2\sin\theta + 1$ as a rectangular function and a polar function.

$2\sin\theta + 1 = 0$

$\sin\theta = -\dfrac{1}{2}$

$\theta = \dfrac{7\pi}{6}, \dfrac{11\pi}{6}$

$(-r, \theta)$

LIMACON
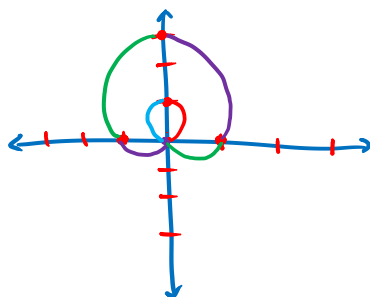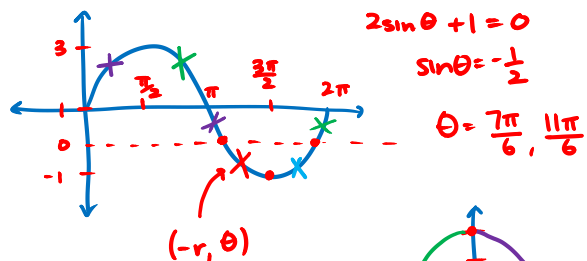
4) Graph $r = 2\cos\theta + 2$ as a rectangular function and a polar function.
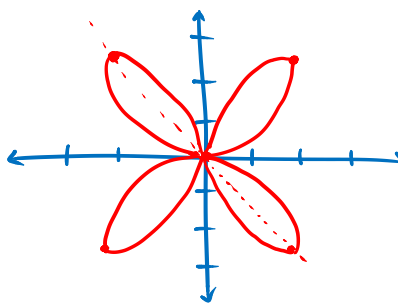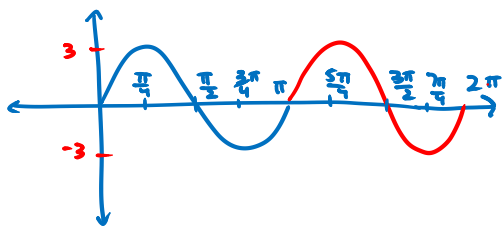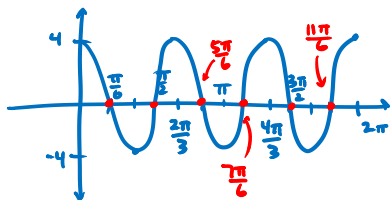
CARDIOID

5) Graph $r = 3\sin 2\theta$ as a rectangular function and a polar function.

$$0 < 2\theta \leq 2\pi$$
$$0 \leq \theta \leq \pi$$

6) Graph $r = 4\cos 3\theta$ as a rectangular function and a polar function.

ROSE

$$0 \leq 3\theta \leq 2\pi \qquad 4\cos 3\theta = 0$$
$$0 \leq \theta \leq \frac{2\pi}{3} \qquad \cos 3\theta = 0 \qquad \cos\alpha = 0$$
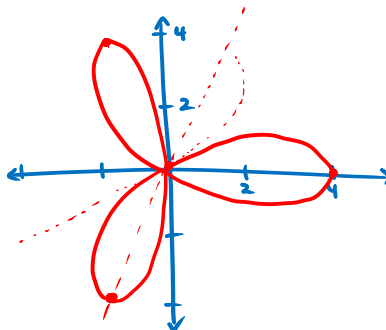$$\alpha = \frac{\pi}{2}, \frac{3\pi}{2} + 2\pi n$$
$$\theta = \frac{\pi}{6} + \frac{2\pi}{3}, \frac{\pi}{2} + \frac{2\pi}{3}$$

7) Graph $r^2 = 4\cos 2\theta$ as a rectangular function and a polar function.

LEMNISCATE