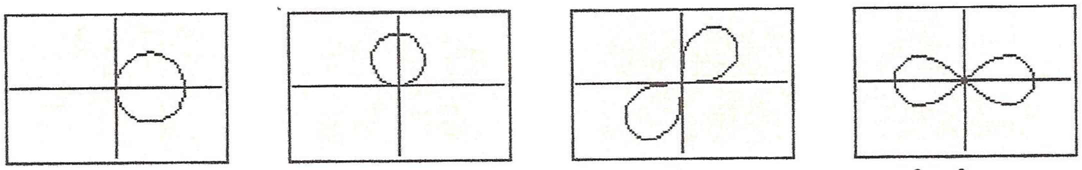
Circles and Lemniscates

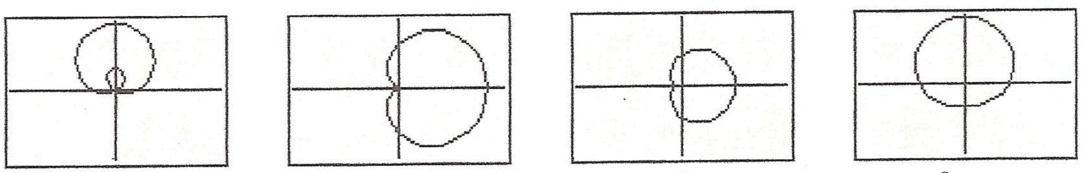
Circles | **Lemniscates**



$r = a\cos\theta$ | $r = a\sin\theta$ | $r^2 = a^2\sin 2\theta$ | $r^2 = a^2\cos 2\theta$

Limaçons

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

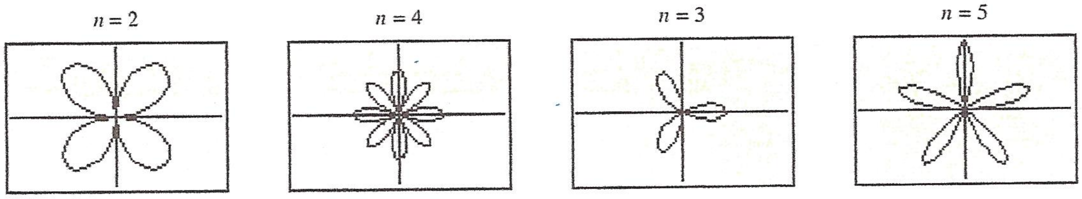


$\frac{a}{b} < 1$ | $\frac{a}{b} = 1$ | $1 < \frac{a}{b} < 2$ | $\frac{a}{b} \geq 2$

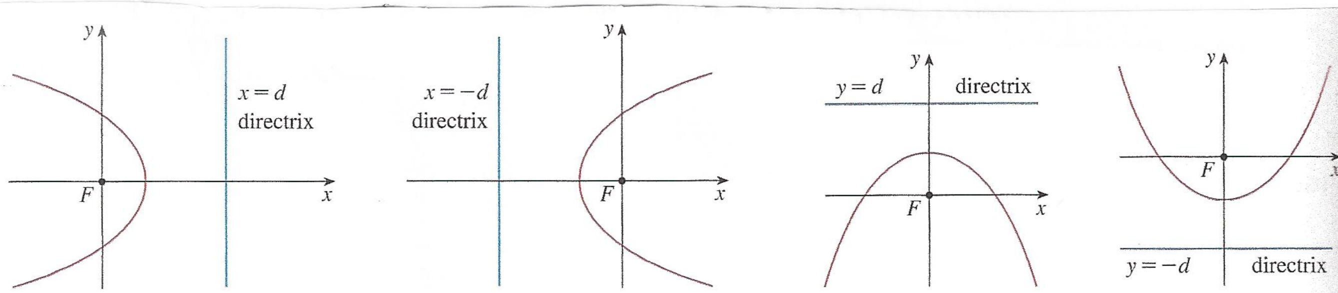
Rose Curves

$2n$ leaves if n is even, $n \geq 2$ | n leaves if n is odd

$n = 2$ | $n = 4$ | $n = 3$ | $n = 5$



$r = a\sin n\theta$ | $r = a\cos n\theta$ | $r = a\cos n\theta$ | $r = a\sin n\theta$



(a) $r = \dfrac{ed}{1 + e\cos\theta}$ (b) $r = \dfrac{ed}{1 - e\cos\theta}$ (c) $r = \dfrac{ed}{1 + e\sin\theta}$ (d) $r = \dfrac{ed}{1 - e\sin\theta}$

FIGURE 2
Polar equations of conics

6 Theorem A polar equation of the form

$$r = \frac{ed}{1 \pm e\cos\theta} \quad \text{or} \quad r = \frac{ed}{1 \pm e\sin\theta}$$

represents a conic section with eccentricity e. The conic is an ellipse if $e < 1$, a parabola if $e = 1$, or a hyperbola if $e > 1$.