

$N = 3$

$N = 4$

$\forall N$

1) Loci

- Elliptic
- Non-Elliptic
- Quasi-Elliptic
- Point
- Circle

3) Mittenpunkt

$$X_9 = 0$$

Circumbilliard

4) Stationary
Cosine Circle

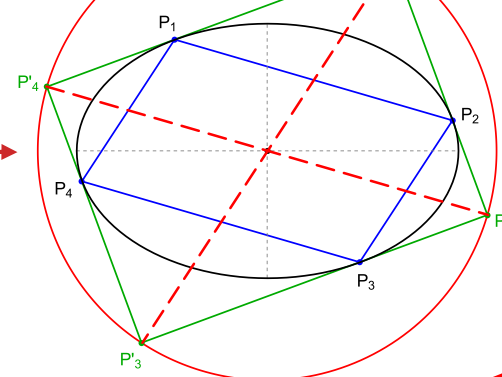
$$r^* = f(L, r/R)$$

2) Constant r/R

Constant:

- $\sum \cos \theta_i$
- $\prod \cos \theta'_i$
- A'/A

Monge's orthoptic



Generalized
Mittenpunkt

Generalized
Stationary Circle

$$r^* = 1/\gamma$$

Constant:

- $\sum \cos \theta_i = 0$
- $\prod \cos \theta'_i = 0$
- A'/A not constant

Constant:

- $\sum \cos \theta_i$
- $\prod \cos \theta'_i$
- A'/A (odd N)

Spatial Integrals

$$\frac{1}{\oint k^{2/3} ds} \oint f(s) k^{2/3} ds$$

0) Integrability
constants

- Perimeter L
- Angular Mom. γ