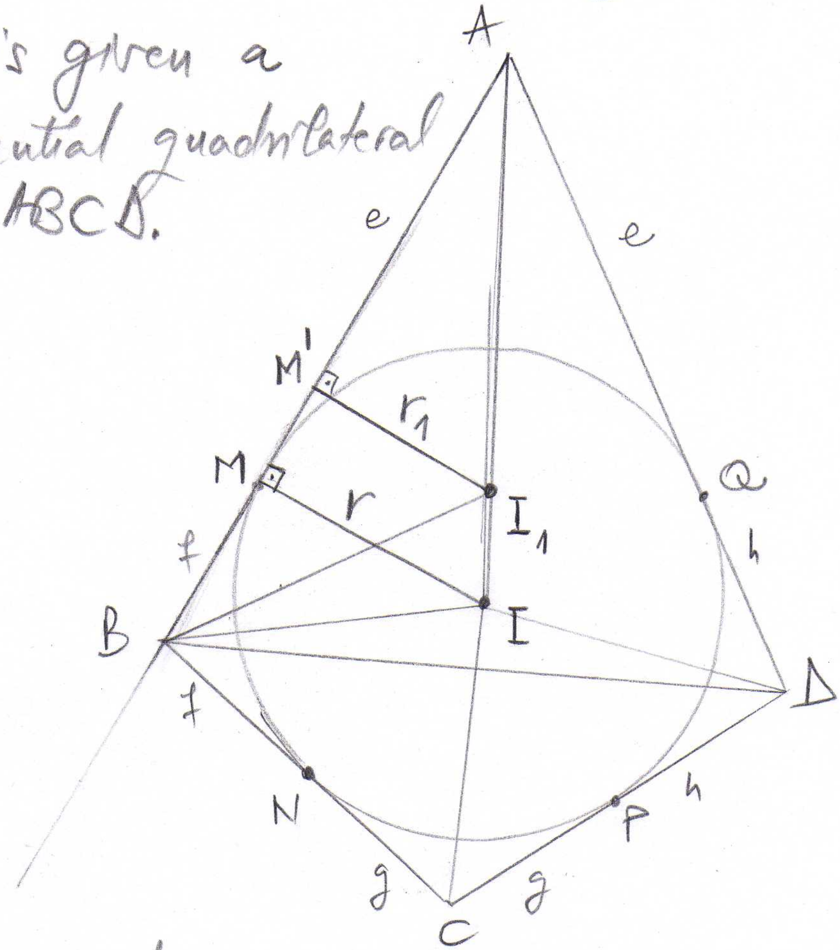
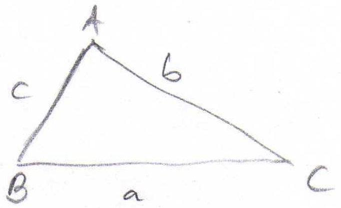
It is given a tangential quadrilateral ABCD.



Let's consider: $AM = AQ = e$; $BM = BN = f$; $CN = CP = g$; $DP = DQ = h$.

Incircles radii of the triangles ABC, BCD, CDA, DAB are r_1, r_2, r_3, r_4.

In any triangle we have: $r = (p-a)\,tg\frac{A}{2}$



$p = \frac{a+b+c}{2}$

Applying in the triangles ABD and BCD we obtain

$$r_4 ctg\frac{A}{2} - r_2 ctg\frac{C}{2} = e - g. \qquad (1)$$

Similar, we have

$$r_1 ctg\frac{B}{2} - r_3 ctg\frac{D}{2} = f - h \qquad (2)$$

$$ctg\frac{A}{2} = \frac{e}{r}; \quad ctg\frac{C}{2} = \frac{g}{r}; \quad ctg\frac{B}{2} = \frac{f}{r}; \quad ctg\frac{D}{2} = \frac{h}{r}$$

Relations (1) and (2) can be written

$$er_4 - gr_2 = r(e-g)$$

and

$$fr_1 - hr_3 = r(f-h)$$

if $e-g \neq 0$ and $f-h \neq 0$, then

$$r = \frac{er_4 - gr_2}{e-g} = \frac{fr_1 - hr_3}{f-h}$$

if $e-g=0$ or $f-h=0$, then

$$er_4 = gr_2 \quad \text{or} \quad fr_1 = hr_3$$

if $e-g=0$ and $f-h=0$, then

$$r_1 = r_3 \text{ and } r_2 = r_4$$