263. Alternative Proof of a Standard Theorem in Geometrical Conics

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262. [c 1. f] *Note on Turning Values.*

The following three theorems are obvious to the graphist, all functions mentioned being continuous.

- I. If $f''(a)=0$, $f''(a)\neq 0$, then $f(a)$ is a turning value.
- II. If $f'(a)$ is a turning value, then $f(a)$ is an inflexion value.
- III. If $f'(a)$ is a zero inflexion value, then $f(a)$ is a turning value.

Suppose now that $f_r(a)=0$ when $r=1, 2, 3, \dots, n-1$, but that $f_n(a)\neq 0$.
Then

- by I. $f_{n-2}(a)$ is a turning value ;
- $\therefore$ by II. $f_{n-3}(a)$ is a zero inflexion value ;
- $\therefore$ by III. $f_{n-4}(a)$ is a turning value ;
- $\therefore$ by II. $f_{n-5}(a)$ is a zero inflexion value ;

and so on, so that $f(a)$ is a turning value or an inflexion value according as n is even or odd.

E. J. NANSON.

263. [L. 4. a.] *Alternative proof of a standard theorem in Geometrical Conics.*

Let S be one focus and I, J its respective images in the two tangents TP , TQ from an external point T to an ellipse.

Since $TI(=TS)=TJ$, and $HI(=2AC)=HJ$, therefore TH is perpendicular to (and bisects) IJ .

Moreover, TQ is perpendicular to SI .

Therefore angle $HTQ=SQI=\text{half } STI$ at the centre $=STP$.

W. P. WORKMAN.

REVIEWS.

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(Cambridge University Press.)

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