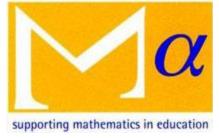
## MATHEMATICAL ASSOCIATION



188. Proof of Taylor's Theorem
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The ratio of corresponding ordinates is indeterminate when x=a. But, drawing the tangents  $AT_1AT_2$  at A, we have

$$\frac{F'(x)}{f(x)} = \frac{P_1 M}{P_2 M} = \frac{P_1 M}{T_1 M} \frac{T_1 M}{T_2 M} \frac{T_2 M}{P_2 M}$$
$$= \frac{P_1 M}{T_1 M} \cdot \frac{A M \tan T_1 A M}{A M \tan T_2 A M} \cdot \frac{T_2 M}{P_2 M},$$

and therefore when AM diminishes without limit

$$\begin{aligned} & \operatorname{Lt}_{x=a} \frac{F(x)}{f(x)} = 1 \times \frac{\tan T_1 A M}{\tan T_2 A M} \times 1 \\ & = \frac{F'(a)}{f(a)}. \end{aligned}$$

The extension to the case where F'(a) and f'(a) both vanish is obvious. C. S. JACKSON.

187. [J. 5.] The Continuum.

Readers of the Gazette may be interested to know that Professor E. V. Huntington has concluded his series of articles in the Annals, "Mathematics on the Continuum" and the "Transfinite Numbers." They form an elementary introduction to some of the problems so actively debated at the present time in the field of Cantor's Mengenlehre. W. J. G.

188. [C. 1. e.] Proof of Taylor's Theorem.

Let 
$$R = f(z) - f(z-h) - h f'(z-h) - \frac{h^2}{2} f''(z-h) - \dots - \frac{h^n}{n} f^{(n)}(z-h),$$
  
hen  $\frac{dR}{dh} = \frac{h^n}{n} f^{(n+1)}(z-h).$ 

th

Keeping z constant, 
$$R = \int \frac{h^n}{|n|} f^{(n+1)}(z-h) dh + \text{const.}$$

But R=0, if h=0;

$$\therefore R = \int_0^h \frac{h^n}{n} f^{(n+1)}(z-h) dh,$$

which can be transformed or discussed in the usual way. The only thing the student has to remember is to put z for x+h, and therefore z-h for x in the usual formula. G. H. BRYAN.

189. [K. 13. a.] The Remarque Minuscule (Note 167, Gazette, May 1905) occurred to me also in 1887, and has been set in Aberystwyth and University of Wales' Examinations. It is, however, probably older, and contained in Bellavite's striking theorem, viz. if ABCD..., A'B'C'D'... be similar polygons inversely situated, and if AA'BB'CC', etc., be divided at P, Q, R, etc., each in the ratio of the linear dimensions of the polygons, then P, Q, R, etc., lie in a straight line.

The following extension of simple proof by Vector methods. If  $P_1$ ,  $P_2$  be points in AA' such that  $AP_1$ .  $AP_2: A'P_1$ .  $A'P_2: :AB^2: A'B'^2$ , and if BB' be divided at  $Q_1Q_2$  similarly to  $AP_1P_2A'$ , then  $P_1Q_1P_2Q_2$  are equally inclined to AB, A'B'.R. W. GENESE.

190. [V. 1. a.]. An apparatus for teaching long multiplication.

I devised this, in the first instance, to enable my pupils to change from the old method (left to right) to the new (right to left), without confusion. It consists essentially of a blackboard composed of four (or more) rect-

angular slats  $(1.2 \times 15$  m.'s each) which slide in horizontal grooves. The local carpenter made mine for 12s. 6d.

278