THE MISTAKES BY CAUCHY

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Abstract. I find the mistake in Cauchy's theorem of Complex variables.

For the zeta function [1] we have

$$A := \int_C dx \frac{x^{s-1}}{e^x - 1}$$

analytic in the whole complex plain, but for $s > 1$

$$A = \int_0^\infty dx \frac{x^{s-1} - (e^{2\pi i}x)^{s-1}}{e^x - 1}$$

for great n

$$|A^{(n)}(s)| > |C' \int_0^1 dx \ln^n x(x^{s-1} - (e^{2\pi i}x)^{s-1})/x| > C|1 - e^{2(s-1)\pi i}|n!/|(s-1)^n|, C > 0.1$$

This means it has convergent radium $|s-1|$. Use this function we can easy to deny the Cauchy's theorem, which's proof by Cauchy mistake in the the series of a line that approaches to a point, which's integration can't be defined sanely. Calculation evince that the error of the integration in the limit doesn't converge to zero.

References

[1] H. M. Edwards (1974). Riemann's Zeta Function. Academic Press. ISBN 0-486-41740-9.

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Date: Apr 27, 2014.
2010 *Mathematics Subject Classification.* 30B10.