

## Large values of the zeta-function at its critical points

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Let  $\rho_1 = \beta_1 + i\gamma_1$  denote a zero of  $\zeta'(s)$ . The question of how large the zeta-function can be at such a point has relevance to the geometry of the level curves of the zeta-function. We show that for all  $T$  sufficiently large there exists a zero  $\rho_1$  of  $\zeta'(s)$  with  $\beta_1 > 1$  and  $T < \gamma_1 < 2T$  such that

$$|\zeta(\rho_1)| > (1/4 e^{C_0} - o(1)) \log \log T,$$

where  $C_0$  is Euler's constant. This is unconditional but, assuming the Riemann Hypothesis, we show that for all  $T$  sufficiently large there also exists a zero  $\rho_1$  with  $\beta_1 > 1$  and  $T < \gamma_1 < 2T$  such that

$$|\zeta(\rho_1)| < (1/2 e^{C_0} + O(1)) \log \log T.$$

We conjecture that this holds with  $1/2$  replaced by  $1/4$ . This is joint work with Hugh Montgomery.