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Optimal bounds of $\pi(n)$ using Zagier's method.

Zagier showed using elementary methods, that $\pi(n)$ can be bounded by $\frac{2}{3} \frac{n}{\log(n)} < \pi(n) < 1.7 \frac{n}{\log(n)}$. His proof, which used strong induction and properties of the binomial coefficients, yielded upper and lower bounds that vary as a function of n .

We improved on Dr. Zagier's claim by showing that the optimal bounds that can be obtained using Zagier's method are $\log(2) \frac{n}{\log(n)} < \pi(n) < \log(4) \frac{n}{\log(n)}$. (Received September 10, 2014)