1116-11-1030 **Sungjin Kim*** (707107@gmail.com), 3442 Jasmine Ave APT 5, Los Angeles, CA 90034. *Average Results on the Order of a modulo p.* Preliminary report.

Let $a > 1$ be an integer. Denote by $l_a(p)$ the multiplicative order of a modulo primes p. We prove that if $\frac{x}{\log x \log\log x} = o(y)$, then

$$\frac{1}{y}\sum_{a\le y}\sum_{p\le x}\frac{1}{l_a(p)} = \log x + C\log\log x + O\left(\frac{x}{y\log\log x}\right)$$

which is an improvement over a theorem by Felix [?].

Additionally, we also prove two other average results

If $\log^2 x = o(\psi(x))$ and $x^{1-\delta}\log^3 x = o(y)$, then

$$\frac{1}{y}\sum_{a<y}\sum_{\substack{p<x\\ l_a(p)>\frac{x}{\psi(x)}}} 1 = \pi(x) + O\left(\frac{x\log x}{\psi(x)}\right) + O\left(\frac{x^{2-\delta}\log^2 x}{y}\right).$$

Furthermore, if $x^{1-\delta}\log^3 x = o(y)$, then

$$\frac{1}{y}\sum_{a<y}\sum_{\substack{p<x\\ p\nmid a}} l_a(p) = c\mathrm{Li}(x^2) + O\left(\frac{x^2}{\log^A x}\right) + O\left(\frac{x^{3-\delta}\log^2 x}{y}\right)$$

where

$$c = \prod_p \left(1 - \frac{p}{p^3-1}\right).$$

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