1131-37-91 **Hiroki Sumi*** (sumi@math.h.kyoto-u.ac.jp), Grad. Sch. of Human and Environmental Studies, Kyoto University, Yoshida-Nihonmatsu-cho, Sakyo-ku, Kyoto, 6068501, Japan. *Finding Roots of Any Polynomial by Random Relaxed Newton's Methods.* Preliminary report.

We develop the theory of random holomorphic dynamics and apply it to finding roots of any complex polynomial by random relaxed Newton's methods. More precisely, for any polynomial g of degree two or more, let $N_{g,\lambda}(z) = z - \lambda \frac{g(z)}{g'(z)}$, where z is a point in the Riemann sphere and $\lambda \in \{\lambda \in \mathbb{C} \mid |\lambda - 1| < r\}(1/2 < r < 1)$ and we consider the random dynamical system on the Riemann sphere such that at every step we choose $\lambda \in \{\lambda \in \mathbb{C} \mid |\lambda - 1| < r\}$ according to the uniform distribution, and map the point under $N_{g,\lambda}$. We show that for any polynomial g of degree two or more, for any initial value z in the complex plane which is not a root of g', the random orbit starting with z tends to a root of g almost surely, which is the virtue of the effect of randomness. In fact, such a statement cannot hold in the deterministic relaxed Newton's method and any other deterministic complex analytic iterative schemes to find roots of polynomials (M. Hurley ETDS 1986, C. McMullen Ann. Math. 1987). Thus the above result deals with a randomness-induced phenomenon. For the preprint, see https://arxiv.org/abs/1608.05230. (Received July 06, 2017)